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Using Structural Equation Modeling to Explore Associated Factors of Intimate Partner Violence in a Sample of Chinese Rural Women: A Cross-sectional Study

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Abstract

Objectives

To estimate the prevalence of IPV, and explore associated factors for IPV based on a rural sample of women.

Setting

Rural area of Guangyuan city, Sichuan, China.

Participants

We recruited women in total aged 16 years and above, had lived locally for at least 2 years and reported being married or in a relationship in the preceding year. In total, there were 1501 women eligible for this study, and the response rate was 100%.

Methods

Participants completed demographic and social economic measures, the Revised Conflict Tactics Scale, and the Duke Social Support Index. We applied chi-square test and ANOVA for data description, and confirmatory factor analysis for the exploration of associated factors of IPV.

Results

The total prevalence of IPV in the past 12 months was 29.05%, and the prevalence of physical, psychological, and sexual violence were 7.66%, 26.58%, and 3.20% respectively. The total prevalence was the highest among women aged 16 to 29, received junior high school education, and believing family financial status was very poor and same as before. Comparing with IPV victims, non-victims showed higher level

of social support. Confirmatory factor analysis showed that when social support increased 1 unit, the risk for physical, psychological and sexual violence decreased 0.12, 0.35 and 0.12 units respectively; when economic status increased 1 unit, the risk for physical, psychological and sexual violence indirectly decreased 0.047, 0.014 and 0.047 units respectively, but the total effects were not significant; when education increased 1 unit, the risk for psychological violence decreased 0.056.

Conclusion

We suggest future work is needed to create, disseminate and test potential IPV interventions focusing on building social support network and increasing individuals' perceived social support level to ameliorate the morbidity and mortality associated with IPV.

Keywords

Intimate partner violence; Violence against women; Rural Chinese women; Social support;

Strength and limitations

1. Strengths of this study are that it is the first population-based study in this rural region to estimate the prevalence and associated factors of IPV among women who were married or in a relationship in proceeding 12 months. In particular, we considered three forms of IPV including physical, psychological and sexual violence.

2. We applied confirmatory factor analysis to explore associated factors of IPV, which could reveal the underlying structure of observed factors and estimate the strength of relationships between latent and observed factors.
3. Limitations include that we might miss residents who had day-jobs and were not at home; we did not investigate women's financial contributions to their families which could be an important factor associated with IPV. And at last, cultural barriers could prevent women from reporting victimized experiences.
4. Due to the vast territory and many nationalities of China, it must be cautious to generalize results.

Introduction

Intimate partner violence (IPV), and violence against women in particular, is a prevalent and global public health concern[1]. The World Health Organization (WHO) reports four types of IPV including physical violence, psychological violence, sexual violence, and controlling behaviors; and victims may experience different types of violence at a same time [2]. A large WHO multi-country study reported lifetime rates of physical and sexual violence by an intimate partner ranged from 13% to 61% and 6% to 59% respectively[1 3].

Although much is known about IPV worldwide, very little is known about it in China. Since 2000, Hong Kong researchers have published myriad articles focusing on child abuse[4], incest [5]and the emergence of non-governmental entities to address violence against women [6]. While these often stigmatizing topics are addressed in the literature, the research on violence against women in China remains nascent. A 2004 study examined data from the 1999-2000 Chinese Health and Family Life Survey and reported among adults aged 20 to 64 years, 34% of women were hit during their current relationship and 19% of respondents reported male-to-female IPV[7]. Other studies were conducted in urban medical settings. For example, Xiao and colleagues surveyed 600 women in an urban outpatient gynecology clinic and found 43% reported lifetime violence (including physical violence, sexual violence, or both), placing them squarely in the mid-range when compared to international communities [8]. A recent multi-country study, including the USA, India, Nigeria, South Africa and China, reported that the IPV rate in the past year was 10.2% among ever-partnered women in Shanghai [9]. Pan Teng

and colleagues recruited 1,368 women in Guangzhou and reported the prevalence of IPV over the past year was 39.2% for local women and 41.2% for migrant women [10].

Compared to studies in urban settings, few studies discuss IPV against women living in rural China. A study based on 3,998 married women, rural Chinese women reported prevalence for IPV in past-year was 65.0%, and the prevalence for physical, psychological and sexual violence was 29.8%, 58.3% and 16.9% respectively[11]. However, when compared to a community-based survey that sampled patients from urban, rural and industrial areas in Hunan, the lifetime reported rate of IPV was 12.4%, 3.3% and 14.5% respectively [12]. It is unclear whether such discrepancies accurately reflect true differences or variations in sampling, measures, reporting, and other social factors that can impede valid epidemiological assessments.

In addition to variable prevalence rates, there is a dearth of information about common IPV risk factors in rural Chinese settings. Though little is known about the risk factors specifically associated with IPV in rural China, there have been many studies across cultures, not specific to female victimization, that provide some clues. Commonly reported IPV risk factors include young age, low education, low socio-economic status/income, substance use, male dominance in the family, infidelity, high proportion of neighborhood poverty, acceptance of violence and divorce regulations by the government[2 3 13-16]. The purpose of this paper is to explore these risk factors among a sample of rural Chinese women living in Hunan province. We use the social ecological model to contextualize commonly studied risk factors within a framework (see Figure 1)

and to generate hypotheses regarding IPV risk factors [17].

Insert Figure 1 here.

In light of China's extraordinary economic transformation and the major social changes that are sweeping across rural regions of the country, we see a need for further studies of IPV. Family structures and roles are changing rapidly, with unmatched levels of internal workforce migration from west to east and inland rural to urban coastal regions. This "floating population" predominately includes men [18]; consequently, the term "left-behind" implies too much homogeneity among the women, elders, and children who do not migrate for work, and it denotes populations that have emerged during the past two decades. Among the "left-behind" population, most of them are rural women who devote themselves to family responsibilities. However, we have little understanding about how these dramatic changes have affected these women of common social and interpersonal problems such as IPV.

Our study focuses on data collected from the rural areas of Guangyuan City in Sichuan province to estimate the prevalence of IPV and to explore associated factors. Of noted, a "city" in China is most often comprised of multiple regions including counties, towns, villages, and rural areas; and Guangyuan region, especially its rural towns and villages in mountainous areas, has been stricken by the Wenchuan earthquake in 2008. We hypothesize lower prevalence rates in Guangyuan region than in rural areas of northeast China, where IPV against women is acceptable in the regional culture[11]. We also hypothesize social ecological factors from all levels (personal and interpersonal level)

will have a direct influence on IPV.

Method

This study is part of a larger epidemiological study conducted in rural areas of Guangyuan City in Sichuan province in July 2012. The larger study assessed the prevalence of distress and diagnosed psychopathology among rural women, and explored how women understand their conditions[19 20]. Guangyuan City is located in the north of Sichuan, a southwestern province in China, with approximately 820,000 people in urban areas and 1.66 million in rural areas[21]. This regional area is economically underdeveloped with the per capital net income of 4035.5 Yuan (equivalent to 585.3 USD) for rural household in 2010, one of the lowest in the province [22].

Participants

The sampling strategy is discussed in greater detail elsewhere[20]. We recruited a socio-economically diverse sample and used multi-stage sampling to randomly select towns and villages for this study. We included all women, aged 16 years and older (16 years is the age of consent in China), who had lived locally for at least 2 years and reported being married or in a relationship in the preceding year. Local hospitals provided a list of eligible women based on the Chinese household registrations system (the *hukou*), which excluded women if: 1) they had diagnosed mental or cognitive problems, such as schizophrenia, autism, dementia and mental retardation, which would

impede their abilities to comprehend and answer questions; 2) they were unable to communicate due to being deaf or mute.

Considering rural Chinese women usually have low education or could be illiterate, we provided verbal informed consent without an information sheet. Participants joined the study only when they provided oral consent after being informed of the study purpose during a private, face-to-face interview in their homes. We provided participants toiletry items (such as toothpaste and soap) worth 5 Yuan (about 0.8 USD) to compensate them for their time. Additionally, interviewers provided helpful IPV resources with participants who endorsed IPV.

Procedure

We conducted the field survey in July 2012. Local government and Guangyuan Mental Health Center staff assisted us with recruitment. They coordinated with village leaders and village doctors, and held public information sessions about this study before the survey began. During the field survey, village leaders, doctors and reputable seniors led interviewers door-to-door to conduct the interviews. As some villages have low population density, local residents helped interviewers by transporting them door-to-door on motorcycles. When an eligible participant was not at home, or unavailable, the interviewer would return twice more. Interviewers conducted the surveys on their personal computers during the face-to-face interviews. Interviewers deleted the data their computers after putting the data on the research leader's flash drive.

Measures

Demographic information questionnaire

We designed the demographic questionnaire to collect socio-demographic information from participants. Items included age and education.

Family economic status

The family economic status questionnaire asks about family annual income, family property information, perceived family economic status, family economic status compared with others in the village and compared with previous years.

Information provided about family annual income depended on participants' recall, and was usually an estimation; therefore, we also collected information on property to evaluate participants' economic status. We asked whether a participant's family owned a TV, personal computer, modern kitchen range, mobile phone, DVD/VCD, refrigerator, sofa, modern living furniture (Western style composite furniture), two wheeled motorized vehicles, three wheeled or above motorized vehicles, air conditioner, washing machine, and bank account with over 10,000 Yuan (about 1,571 USD). We assigned a one for each of the items the participant's family owned, and a zero for those they did not; the score ranged from 0 to 13.

Social support

We applied the 23-item Duke Social Support Index (DSSI) to evaluate participants' social support [23]. The Chinese version has already been used in research, and studies in Chinese rural samples reported internal consistency over 0.79[24 25]. DSSI assesses social

interaction, perceived support and instrumental social support. Every answer has an assigned score, and these are added up to determine the total score (possible total scores ranged from 11 to 45); higher scores indicate higher social support levels. Our Cronbach's α was 0.835.

IPV experience

We applied the Short Form of the Revised Conflict Tactics Scale (CTS2S) to investigate participants' IPV experiences, which measures negotiation, psychological aggression, physical assault, injury, and sexual coercion, has acceptable validity and sensitivity [26]. In our previous study, the CTS2S showed good internal reliability and structural validity in rural China [27].

The CTS2S contains statements about participants' experiences during the past 12 months and examines the frequencies of those events. We administered six victimization questions from the survey, across three IPV domains (physical violence, psychological violence, and sexual violence). For this study, participants were considered positive for IPV if they endorsed any of the six questions. Our Cronbach's α was 0.845.

Quality control

The larger epidemiological study described interview training and quality control measures in detail [20]. Briefly, we recruited interviewers from West China School of Public Health of Sichuan University; faculty members from Sichuan University and University of Rochester Medical Center conducted training sessions related to methods, interviewing skills, qualitative methods, and safety regarding IPV identification. We

deployed three research teams, each had eight interviewers and was led by experienced senior researchers. Questions were routinely checked for missing items post-interview to reduce missing data issues.

Analysis

Given that several risk factors can influence IPV both separately and collectively and are likely to be highly collinear [3], we used confirmatory factor analysis (CFA). CFA is a type of structural equation modeling (SEM), which allows researchers to determine the underlying structure of a set of observed factors based on *a priori* hypotheses, and to estimate the strength of relationships between latent and observed factors [28 29].

We hypothesized that there were six latent factors including objective economic status, subjective economic status, social support, physical violence, psychological violence, and sexual violence) and two observed factors (including age and education). Factors' labels and assignments are shown in Appendix 1.

We have a priori hypotheses based on the social ecological model according to an report on violence and health[30], more specifically they are: 1) age, education, objective economic status, subjective economic status, and social support have direct effects on physical violence, psychological violence and sexual violence; 2) age and education may have indirect effects on physical violence, psychological violence and sexual violence through objective economic status, subjective economic status and social support; 3) objective economic status may have indirect effects on physical violence, psychological

violence and sexual violence through subjective economic status and social support.

We ran the analysis with Mplus 7.3. and applied mean and variance-adjusted WLS estimator (WLSMV) as the default estimation method in order to handle categorical continuous variable in Mplus [31]. The default model estimators in WLSMV include chi-square value (χ^2), degrees of freedom (df), χ^2/df, root-mean-squared error of approximation (RMSEA) and its 95% confidence interval (90%CI), comparative fit index (CFI), Tucker-Lewis Index (TLI), and weighted root-mean-square residual (WRMSR). Criteria to assess the model include: the lower chi-square value and degrees of freedom, the better the model; CFI and TLI values should be 0.90 and over; the RMSEA value should be 0.06 and below, the lower limit of 90%CI should be 0 or close to 0, and its upper limit of 90%CI should be 0.08 and below; the value of χ^2/df should be under 5.0 [31 32].

With respect to age, and consistent with our previous research[19 20], we categorized participants into six age groups based on frequencies. For educational attainment, we divided participants into five groups. We divided participants into six groups based on family annual income and four groups based on perceived family economic status: affluent, basic needs met, poor, and very poor. We divided participants into three groups based on their family economic status compared with others: wealthier, same, and poorer, and three groups based on their family economic status compared with previous years: better, same, and worse. With respect to perceived health status, we divided participants into four groups: very good, good, average and bad. Finally, we divided

participants into five groups based perceived activity status: “normal,” “cannot do heavy farm work, but can do light farm work,” “cannot do any farm work, but can do house work,” “cannot do house work but can take care of myself,” and “cannot take care of myself.” We applied chi-square test and ANOVA for data description, and the statistical significance level was 0.05.

Results

Demographic information

We recruited 1,501 women who were eligible for this study, and all of them completed surveys with a response rate of 100%. However, we found there were 17 participants, 1.13% of total sample, who did not answer to either perceived family financial status, family economic status compared with others or family economic status compared with previous years. Since the 17 participants provided all other demographic information, social support, and IPV experiences, we only exclude them in confirmatory factor analysis.

Participants' age ranged from 16 to 87 years old, with a mean (SD) of 46.44 (13.11) years. Overall, participants were not well educated: 33.11% had never been educated, 41.51% had received primary school education, and only 7.99% had received high school education and above. Most participants’ annual family income status was under 40,000 Yuan: 17.65% were under 9,999 Yuan; 24.72% were between 10,000 and 19,999 Yuan; 24.25% were between 20,000 and 29,999 Yuan; and 14.19% were between 30,000 and 39,999 Yuan. Meanwhile, 52.50% felt their family economic status was basic

enough, and 31.25% felt it was poor. However, if participants compared their family economic status to others in the village, 57.16% felt it was the same comparing with that 36.38% felt it was poorer. Most participants, 74.55%, considered their family economic status better than in previous years, compared with 9.13% who considered it worse. With respect to the score of family properties, normality test showed it was negatively skewed distribution with the coefficients of kurtosis and skewness as -0.631 and -0.311; hence, we calculated its range, median and quartile, which were 0 to 13, 8 and 5 respectively. The mean score for DSSI was 37.33±5.13; and the mean scores for social interaction, perceived social support and instrumental social support were 7.81±1.70, 18.89±2.74, and 10.62±2.38 respectively. Details are shown in Table 1.

Insert Table 1 here

IPV experience

Participants reported an IPV prevalence rate of 29.05% (436/1501). With respect to physical, psychological and sexual violence, shown in Table 2, the prevalence was 7.66% (115/1501), 26.58% (399/1501) and 3.20% (48/1501) respectively.

The overall IPV prevalence was the highest for women aged 16-29 years old (37.35%), followed by 31.20% for women aged 40-49 years old; it was the lowest for women 70 years old and above. Prevalence rates also differed by education level. The prevalence was the highest (35.33%) for women with junior high school education, followed by 31.82% for women with college education and above, and it was the lowest (24.55%) for women with no education. IPV prevalence rates varied by perceived

economic status in this sample. Prevalence was the highest (40.43%) for women whose perceived family economic status was very poor, followed by 32.20% for women whose perceived family economic status was poor, and it was the lowest (26.14%) for women whose perceived family economic status was basic enough; prevalence was also highest (35.53%) for women whose perceived family economic status was the same as previous years, followed by 31.39% for women whose perceived family economic status was worse than previous years, and it was the lowest (27.61%) for women whose perceived family economic status was better than previous years. The study also found IPV victims had lower total social support levels; the total score of DSSI was 36.28±5.86 for victims, and 37.77±4.74 for non-victims. Victims also had lower perceived and instrumental social support. Details are shown in Table 1 and Table 2.

Insert Table 2 here

Confirmatory factor analysis

Model testing

After seven iterations, we had the best fitting model. In Model 7, the χ^2 was 129.23, the df was50, the χ^2/df was 2.58, the RMSEA was 0.032 and its 95% confident interval (95%CI) was from 0.026 to 0.039, the CFI was 0.991, the TLI was 0.987 and the WRMSR was 1.116. According to the modification indexes, there was no error covariance that could be set as free parameters based on knowledge, hence we chose Model 7 as the final model. Table 3 showed the factor loadings and coefficients of the final model.

Insert Table 3 here

Direct and indirect effects of the final model

The results supported the a priori hypotheses that: 1) social support had direct effects on physical, psychological and sexual violence; 2) objective economic status had indirect effects on physical, psychological and sexual violence through social support; 3) education had indirect effect on psychological violence through social support and objective economic status. Table 3 and Figure 2 show the effects.

As displayed in Table 4, we found that: 1) as education increased 1 unit, the risk for psychological violence decreased 0.056; 2) as economic status increased 1 unit, the risk for physical, psychological and sexual violence indirectly decreased 0.047, 0.014 and 0.047 units respectively, but the total effects were not significant; 3) as social support increased 1 unit, the risk for physical, psychological and sexual violence decreased 0.12, 0.35 and 0.12 units respectively.

Insert Table 4 and Figure 2 here.

Discussion

IPV is well-recognized as an important global health challenge, but it is not yet well understood in China, particularly given the wide variability in reported prevalence. The variability in earlier work may be attributed to the deep cultural roots that may impede accurate reporting, methods in the relatively scant research that has already been done, and the geographic variation among different studies.

The prevalence rates from studies focusing on rural Chinese women experiencing IPV

were not consistent. A study focusing on married women under 37 years old in central China reported that the total lifetime IPV prevalence was 7.3%, the prevalence of minor and severe physical violence was 6.4% and 5.8%, and the prevalence of psychological an sexual violence were 3% and 1% respectively[33 34]; another study in north China, reported that the prevalence of physical, psychological and sexual violence among women were 12.4%, 20.6% and 11.2% [35]. Our results were close to Gao and Tamara 's study in Ning Xia, the north west of China, which reported the prevalence of physical, psychological and sexual violence was 4.4%, 23.9% and 1.1% [36].

There may be two possible explanations for the variability. First, studies were conducted in different areas of China, where differences in local cultural context and economic development may impact attitudes towards violence against women. Thus, in some cases, victims may perceive their experiences of violence as normal and/or private, resulting in response bias. Traditional Chinese practices, influenced by Confucian doctrine, emphasize the inferior social status of women. A famous Confucian doctrine states that there are three kinds of obedience for women: "*San Cong*" (obeying your father before you are married, obeying your husband during marriage, and obeying your sons after your husband dies), "*Si De*" (four kinds of virtues including fidelity, tidiness, propriety in speech and commitment to needle work) [34 37]. During our CTS2S assessments, several women cited these Confucian credos, when asked about hitting or fighting, to rationalize violent behaviors as their punishment for failing to obey their husbands or partners. Hence, we can expect that the deeper traditional culture roots, the

more underestimated IPV prevalence will be. Second, different studies applied varied research tools such as the Abuse Assessment Screen, the Conflict Tactics Scale, the Revised Conflict Tactics Scale, the Composite Abuse Scale, and self-designed questionnaires or items. The difference in sensitivities and specificities of these tools could account for variability in rates. Despite lower prevalence rates than expected, our findings here revealed important risk and protective factors for IPV among rural Chinese women.

This study also confirmed findings from previous studies suggesting that social support is an important protective factor for IPV against women. Several considerations may explain the association. Several considerations may explain the association. First, social support is often a source of empowerment for women [38]. For example, an ethnographic study revealed that attending social activities could increase women's influence and prestige, and, in turn, decrease the risk for IPV [39]. Similarly, another anthropological study suggested that the more social support women have, the greater their social resources, and the more they pay attention to their rights [40]. Women with higher social support might decide to end the violent relationships and decrease their risks [40]. Second, perpetrators' controlling behaviors usually limit victims' interactions with other people, isolate victims, lower their social support level, and eventually lead to an increase of IPV risk and a vicious cycle [41]. Third, social support will buffer the negative and traumatic experience victims have been through. The Buffer Theory suggests that social support can buffer adverse life events and the negative impacts;

individuals with high social support levels thus could cope with adverse events well and maintain physical and mental wellness [42]. In a 2002 study, Ann Coker and colleagues reported that, among American female IPV victims aged 18 to 65 years old, victims with high social support had greater perceptions of their mental health, better physical health, lower prevalence of depression, anxiety, suicidal ideation and post-traumatic stress disorder (PTSD) [43].

Unlike social support, the association between sociodemographic factors and IPV are not consistent with previous studies. We did not find a significant relationship between age and IPV, but other studies have shown that younger age is a risk factor for both male perpetrators' violent behaviors and female victims' violent experiences [44-48]. This study found that the higher education level rural women had, the lower their risk for psychological violence, which was consistent with other studies [13 49 50]. Though education level had insignificant effects on physical and sexual violence in this study, we attributed this to the fact that the prevalence of physical and sexual violence was lower than psychological violence in this sample. The sample also had a low proportion of women with a relatively high education level; only 120 women received high school education and above.

This study found an indirect relationship between objective economic status and IPV. This relationship remains unsettled in current literature. Some studies reported that low family economic status was a critical risk factor for male to female violence [45]. Faced with the stress of poverty, males are more likely to use violent behaviors as a solution to

release pressure [38]. However, a study in South Africa reported that extremely poor family economic status protects women from IPV [51]. Other studies have reported that, compared with objective family economic status, the contribution women made to family income was a more important factor—women who made little contribution or were totally dependent on their partners faced increasing risk of IPV [34 38 50 52].

We recognize several limitations. As a cross-sectional field study, interviewers were only able to recruit residents at home during the survey days; thus, some who had day-jobs may have been missed. As China has a vast territory and many nationalities, rural women in different areas face various living environments, cultural backgrounds and customs in which attitudes towards IPV may vary; hence we must be cautious to generalize our results. We didn't investigate the relationship between IPV and women's financial contributions to their families. And lastly, it was possible that cultural barriers, those Confusion credos, prevented women from sharing their stories. Another traditional Chinese expression worth mentioning is "*Jia chou bu ke wai yang*," which means one should not reveal family disgrace to outsiders [53-56]. It is possible that the belief in this notion of family disgrace could lead some participants to intentionally under-report male-to-female violence.

Conclusion

IPV is a common phenomenon in rural China. The overall IPV prevalence in the last 12 months in Guangyuan rural area was 29.05%, and the prevalence of physical,

psychological and sexual violence were 7.66%, 26.58% and 3.20% respectively. We found that social support, education and family objective economic status were important to IPV. In 2016, China implemented its first law against violence, which emphasizes global responsibility to stop violence: government departments, judiciary authorities, non-governmental organizations, enterprises and institutions, and the citizens. We suggest future work is needed to create, disseminate and test potential IPV interventions focusing on building social support network and increasing individuals' perceived social support level to ameliorate the morbidity and mortality associated with IPV.

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Conflict of interest

The authors declare that they have not conflict of interest.

Ethical Statement

The Ethics Committee of Sichuan University reviewed and approved the protocol, including the verbal informed consent process (NO.2011004-1). The University of Rochester Research Subjects Review Board reviewed the approval from Sichuan University and approved analyses of de-identified data.

Contribution

FH designed the survey instruments, implemented the field survey, monitored data collection, cleaned the data, developed the plan for analysis, analyzed the data, drafted and revised the paper. CC designed the survey instruments, trained interviewers, assisted with the analysis plan, revised the paper, and supervised FH. MNW designed the survey instruments, trained interviews, and revised the paper. EDC initiated the project, revised the paper, and supervised FH. PQ initiated the project, designed the survey instruments, monitored data collection, cleaned the data, and revised the paper. All authors had full access to all the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis. All authors read and approved the final manuscript.

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Data sharing statement

The data set is available from the corresponding author at qiupeiyuan@scu.edu.cn.

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Table 1 Demographic information of participants

Demographic Characters		n	IPV victim		Prevalence (%)	χ^2	*p*
			No	Yes			
Age	16-29	204	127	77	37.75	19.873	0.001
	30-39	225	159	66	29.33		
	40-49	468	320	146	31.20		
	50-59	364	276	88	24.18		
	60-69	188	138	50	26.60		
	70-	52	45	7	13.46		
Education	Never educated	497	375	122	24.55	11.378	0.023
	Primary school	623	442	181	29.10		
	Junior high school	283	183	100	35.33		
	High school	98	50	26	26.53		
	College and above	22	15	7	31.82		
Family annual income	0-9999 Yuan	265	194	71	26.79	3.237	0.663
	10000-19999 Yuan	371	263	108	29.11		
	20000-29999 Yuan	346	248	98	28.32		
	30000-39999 Yuan	213	152	61	28.64		
	40000-49999 Yuan	116	83	33	28.45		
	≥50000 Yuan	190	125	65	34.21		
Perceived family	Affluent	182	124	58	31.87	9.091	0.028
	Basic enough	788	582	206	26.14		

financial status*	Difficult	469	318	151	32.20		
	Very difficult	47	28	19	40.43		
Comparing with others*	Wealthier	81	62	19	23.46	1.363	0.506
	Same	858	606	252	29.37		
	Poorer	546	384	162	29.67		
Comparing with previous years*	Better	1119	810	309	27.61	6.095	0.047
	Same	228	147	81	35.53		
	Worse	137	94	43	31.39		

	Mean	IPV victim		F	*p*
		No	Yes		
Social support					
Total score	37.33±5.13	37.77±4.74	36.28±5.86	26.289	0.000
Social interaction	7.81±1.70	7.82±1.70	7.81±1.68	0.002	0.962
Perceived social support	18.89±2.74	19.15±2.58	18.24±3.00	35.154	0.000
Instrumental social support	10.62±2.38	10.78±2.18	10.23±2.77	16.778	0.000
Family properties	7.54±2.97	7.50±2.93	7.63±3.05	0.604	0.437

Note: "*" indicates missing data.

"#" indicates using Fisher exact test.

Table 2 IPV experiences of participants

IPV experiences	No (%)	Yes (%)
Ever experienced in the past 12 months	1065 (70.95%)	436 (29.05%)
Physical violence	1386 (92.34%)	115 (7.66%)
Psychological violence	1102 (73.42%)	399 (26.58%)
Sexual violence	1453 (96.80%)	48 (3.20%)

Table 3 Factor loadings and path coefficients of the final model

Model	Dependent variables	Independent variables	Statistics results	
			Standardized coefficient	*p*
Measurement model	OE	A3	0.61	0.00
		A4	0.79	0.00
	PHV	C1	0.84	0.00
		C2	0.98	0.00
	PSV	C3	0.45	0.00
		C4	0.71	0.00
	SV	C5	0.76	0.00
		C6	0.65	0.00
	SS	D1	0.55	0.00
		D2	0.42	0.00
		D3	0.40	0.00
Structure model	PHV	SS	-0.12	0.005
		OE	0.060	0.14
	PSV	SS	-0.35	0.00
		OE	0.11	0.060
	SV	SS	-0.12	0.021
		OE	0.062	0.11
	OE	A1	-0.18	0.00
		A2	0.30	0.00
	SS	A1	-0.068	0.18
		A2	0.13	0.012
		OE	0.41	0.00
Factor related	PSV	PHV	0.91	0.00
	SV	PHV	0.30	0.00
		PSV	0.46	0.00
	C5	C1	0.31	0.00
	D3	D2	0.41	0.00

Note: OE=Objective economic status; SS=Social support; PHV=Physical violence; PSV= Psychological violence; SV=Sexual violence; A1=Age; A2=Education; B1=Family annual income; B2=Family properties; C1= Being pushed, shoved or slapped; C2=Being punched, kicked or beat-me-up; C3=Being insulted, swore, shouted, yelled at; C4= Being threatened to destroy belongings; C5= Sex against will with physical force; C6= Sex against will without physical force; D1=Social interaction; D2=Perceived social support; D3=Instrumental social support.

Table 4 Direct and indirect effects of the final model

Factors	Physical violence			Psychological violence			Sexual violence		
	Direct effect	Indirect effect	Total effect	Direct effect	Indirect effect	Total effect	Direct effect	Indirect effect	Total effect
Age	——	0.005	0.005	——	0.030	0.030	——	0.005	0.005
Education	——	-0.011	-0.011	——	-0.056*	-0.056*	——	-0.011	-0.011
Objective economic status	0.060	-0.047*	0.013	0.11	-0.14*	-0.033	0.062	-0.047*	0.015
Social support	-0.12*	——	-0.12*	-0.35*	——	-035*	-0.12*	——	-0.12*

Note: "*" indicates $p<0.05$.

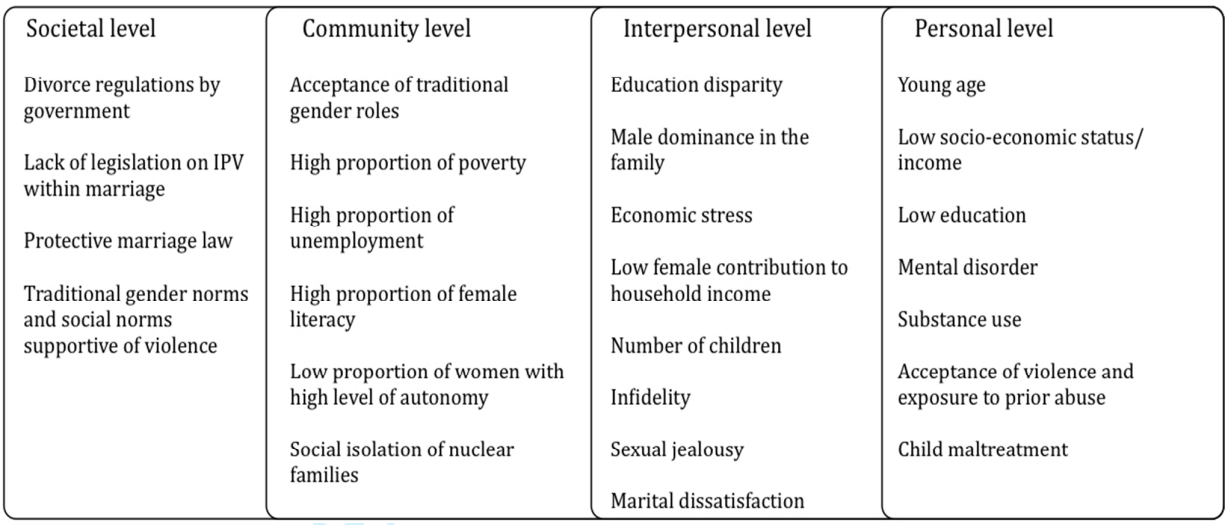

Figure 1 The socio-ecological model of risk factors of IPV

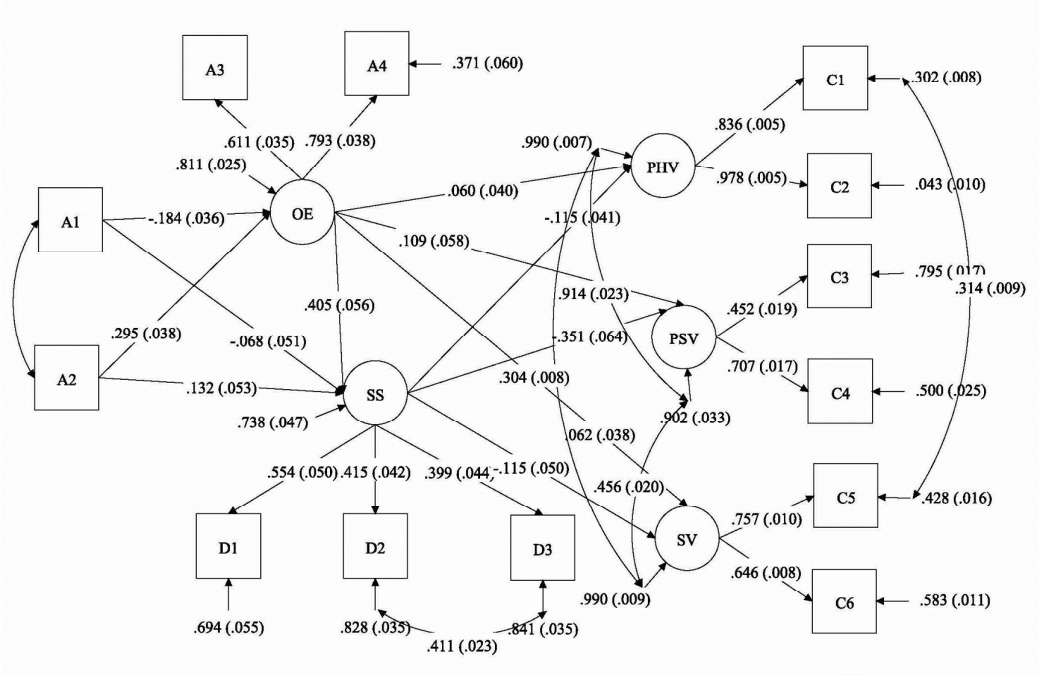

Figure 2 The final confirmatory factor analysis model

Note: OE=Objective economic status; SS=Social support; SE= Subjective economic status; PHV=Physical violence; PSV= Psychological violence; SV=Sexual violence; A1=Age; A2=Education; A3=Family annual income; A3=Family properties; C1= Being pushed, shoved or slapped; C2=Being punched, kicked or beat-me-up; C3=Being insulted, swore, shouted, yelled at; C4= Being threatened to destroy belongings; C5= Sex against will with physical force; C6= Sex against will without physical force; D1=Social interaction; D2=Perceived social support; D3=Instrumental social support.

Appendix 1 Latent and observation factors

Latent factors	Observed factors
	Age, A1
	Education, A2
Objective economic status, OE	Family annual income, A3
	Family properties, A4
Subjective economic status, SE	Perceived family financial status, B1
	Comparing with others, B2
	Comparing with previous years, B3
Physical violence, PHV	Being pushed, shoved or slapped, C1
	Being punched, kicked or beat-me-up, C2
Psychological violence, PSV	Being Insulted, swore, shouted, yelled at, C3
	Being threatened to destroy belongings, C4
Sexual violence, SV	Sex against will with physical force, C5
	Sex against will without physical force, C6
Social support, SS	Social interaction, D1
	Perceived social support, D2
	Instrumental social support, D3

STROBE Statement—checklist of items that should be included in reports of observational studies

	Item No	Recommendation	Page number
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	1
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	2,3
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	5
Objectives	3	State specific objectives, including any prespecified hypotheses	7,8
Methods			
Study design	4	Present key elements of study design early in the paper	8
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	8
Participants	6	(*a*) *Cohort study*—Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up *Case-control study*—Give the eligibility criteria, and the sources and methods of case ascertainment and control selection. Give the rationale for the choice of cases and controls *Cross-sectional study*—Give the eligibility criteria, and the sources and methods of selection of participants	8,9
		(*b*) *Cohort study*—For matched studies, give matching criteria and number of exposed and unexposed *Case-control study*—For matched studies, give matching criteria and the number of controls per case	-
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	10-12
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	10-12
Bias	9	Describe any efforts to address potential sources of bias	21
Study size	10	Explain how the study size was arrived at	8
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	13,14
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	12-14
		(*b*) Describe any methods used to examine subgroups and interactions	No applicable
		(*c*) Explain how missing data were addressed	14
		(*d*) *Cohort study*—If applicable, explain how loss to follow-up was addressed *Case-control study*—If applicable, explain how matching of cases and controls was addressed *Cross-sectional study*—If applicable, describe analytical methods taking account of sampling strategy	8
		(*e*) Describe any sensitivity analyses	No applicable

Continued on next page

Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	14
		(b) Give reasons for non-participation at each stage	21
		(c) Consider use of a flow diagram	-
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	14, 15
		(b) Indicate number of participants with missing data for each variable of interest	14
		(c) *Cohort study*—Summarise follow-up time (eg, average and total amount)	-
Outcome data	15*	*Cohort study*—Report numbers of outcome events or summary measures over time	-
		Case-control study—Report numbers in each exposure category, or summary measures of exposure	-
		Cross-sectional study—Report numbers of outcome events or summary measures	15,16
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	No applicable
		(*b*) Report category boundaries when continuous variables were categorized	14, 15
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	No applicable
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	No applicable
Discussion			
Key results	18	Summarise key results with reference to study objectives	17-21
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	21
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	17-21
Generalisability	21	Discuss the generalisability (external validity) of the study results	21, 22
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	22

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

BMJ Open

Using Confirmatory Factor Analysis to Explore Associated Factors of Intimate Partner Violence in a Sample of Chinese Rural Women: A Cross-sectional Study

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Using Confirmatory Factor Analysis to Explore Associated Factors of Intimate Partner Violence in a Sample of Chinese Rural Women: A Cross-sectional Study

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Abstract

Objectives

To estimate the prevalence of intimate partner violence (IPV) against women and to explore associated factors based on a sample of rural Chinese women.

Design

Cross-sectional study

Setting

Rural areas of Guangyuan city, Sichuan, China.

Participants

We recruited women in total aged 16 years and above, had lived locally for at least 2 years and reported being married or in a relationship in the past 12 months. In total, there were 1501 women eligible for this study, and the response rate was 100%.

Methods

Participants completed demographic and social economic measures, the Short Form of the Revised Conflict Tactics Scale, and the Duke Social Support Index. We applied chi-square test, ANOVA and confirmatory factor analysis for analysis.

Results

The overall prevalence of IPV in the past 12 months was 29.05%, and the prevalence of physical, psychological, and sexual violence was 7.66%, 26.58%, and 3.20% respectively. The overall prevalence was the highest among women aged 16 to 29, received junior high school education, and believing family financial status was very

poor and same as before. Non-victims showed higher level of social support. Confirmatory factor analysis showed that the total effects of social support on physical, psychological and sexual violence was -0.12, -0.35 and -0.12 respectively; the indirect effects of objective economic status on physical, psychological and sexual violence was -0.047, -0.014 and -0.047 respectively, but the total effects were not significant; the indirect effect of education on psychological violence was -0.056.

Conclusion

The prevalence of IPV in Guangyuan is close to that in northwest of China. Social support is an important protective factor. Future work is needed to create, disseminate and test potential IPV interventions focusing on building social support network cross societal sectors and increasing individuals' perceived social support level to ameliorate the morbidity and mortality associated with IPV.

Keywords

Intimate partner violence; Violence against women; Rural Chinese women; Social support;

Strength and limitations

1. Strengths of this study are that it is the first population-based study in this rural region to estimate the prevalence and associated factors of IPV among women who were married or in a relationship in the past 12 months. In particular, we considered

three forms of IPV including physical, psychological and sexual violence.

2. We applied confirmatory factor analysis to explore associated factors of IPV, which could reveal the underlying structure of observed factors and estimate the strength of relationships between latent and observed factors.

3. Limitations include that we might miss residents who had day-jobs and were not at home; we did not investigate factors including child maltreatment, marital dissatisfaction and education disparity between couples, and women's financial contributions to their families which could be important factors associated with IPV. And at last, cultural barriers could prevent women from reporting victimized experiences.

4. Due to the vast territory and many nationalities of China, it must be cautious to generalize results.

Introduction

Intimate partner violence (IPV), and violence against women in particular, is a prevalent and global public health concern[1]. The World Health Organization (WHO) reports four types of IPV including physical violence, psychological violence, sexual violence, and controlling behaviors; and victims may experience different types of violence at a same time [2]. A large WHO multi-country study reported lifetime rates of physical and sexual violence by an intimate partner ranged from 13% to 61% and 6% to 59% respectively[1 3].

Although much is known about IPV worldwide, very little is known about it in China. Since 2000, Hong Kong researchers have published myriad articles focusing on child abuse[4], incest [5]and the emergence of non-governmental entities to address violence against women [6]. While these often stigmatizing topics are addressed in the literature, the research on violence against women in China remains nascent. A 2004 study examined data from the 1999-2000 Chinese Health and Family Life Survey and reported among adults aged 20 to 64 years, 34% of women were hit during their current relationship and 19% of respondents reported male-to-female IPV[7]. Other studies were conducted in urban medical settings. For example, Xiao and colleagues surveyed 600 women in an urban outpatient gynecology clinic and found 43% reported lifetime violence (including physical violence, sexual violence, or both), placing them squarely in the mid-range when compared to international communities [8]. A recent multi-country study, including the USA, India, Nigeria, South Africa and China, reported that the IPV rate in the past year was 10.2% among ever-partnered women in Shanghai [9]. Pan Teng

and colleagues recruited 1,368 women in Guangzhou and reported the prevalence of IPV over the past year was 39.2% for local women and 41.2% for migrant women [10].

Compared to studies in urban settings, few studies discuss IPV against women living in rural China. A study based on 3,998 married women, rural Chinese women reported prevalence for IPV in past-year was 65.0%, and the prevalence for physical, psychological and sexual violence was 29.8%, 58.3% and 16.9% respectively[11]. However, when compared to a community-based survey that sampled patients from urban, rural and industrial areas in Hunan, the lifetime reported rate of IPV was 12.4%, 3.3% and 14.5% respectively [12]. It is unclear whether such discrepancies accurately reflect true differences or variations in sampling, measures, reporting, and other social factors that can impede valid epidemiological assessments.

In addition to variable prevalence rates, there is a dearth of information about common IPV risk factors in rural Chinese settings. Though little is known about the risk factors specifically associated with IPV in rural China, there have been many studies across cultures, not specific to female victimization, that provide some clues. Commonly reported IPV risk factors include young age, low education, low socio-economic status/income, substance use, male dominance in the family, infidelity, high proportion of neighborhood poverty, acceptance of violence and divorce regulations by the government[2 3 13-16]. The purpose of this paper is to explore these risk factors among a sample of rural Chinese women living in Hunan province. We use the social ecological model to contextualize commonly studied risk factors within a framework (see Figure 1)

and to generate hypotheses regarding IPV risk factors [17].

Insert Figure 1 here.

In light of China's extraordinary economic transformation and the major social changes that are sweeping across rural regions of the country, we see a need for further studies of IPV. Family structures and roles are changing rapidly, with unmatched levels of internal workforce migration from west to east and inland rural to urban coastal regions. This "floating population" predominately includes men [18]; consequently, the term "left-behind" implies too much homogeneity among the women, elders, and children who do not migrate for work, and it denotes populations that have emerged during the past two decades. Among the "left-behind" population, most of them are rural women who devote themselves to family responsibilities. However, we have little understanding about how these dramatic changes have affected these women of common social and interpersonal problems such as IPV.

Based on data collected from the rural areas of Guangyuan City in Sichuan province, we aim to estimate the prevalence of IPV, and hypothesize the prevalence would be lower in Guangyuan region than in rural areas of north China, where IPV against women is acceptable in the regional culture[11]. We also aim to explore associated factors for IPV, and hypothesize factors of personal and interpersonal levels of social ecological model will have a direct influence on IPV.

Method

This study is part of a larger epidemiological study conducted in rural areas of Guangyuan City in Sichuan province in July 2012. The larger study assessed the prevalence of distress and diagnosed psychopathology among rural women, and explored how women understand their conditions[19 20]. Guangyuan City is located in the north of Sichuan, a southwestern province in China, with approximately 820,000 people in urban areas and 1.66 million in rural areas[21]. Of noted, a "city" in China is most often comprised of multiple regions including counties, towns, villages, and rural areas; and Guangyuan region, especially its rural towns and villages in mountainous areas, has been stricken by the Wenchuan earthquake in 2008. This regional area is economically underdeveloped with the per capital net income of 4035.5 Yuan (equivalent to 585.3 USD) for rural household in 2010, one of the lowest in the province [22].

Participants

The sampling strategy is discussed in greater detail elsewhere[20]. We recruited a socio-economically diverse sample and used multi-stage sampling to randomly select towns and villages for this study. We included all women, aged 16 years and older (16 years is the age of consent in China), who had lived locally for at least 2 years and reported being married or in a relationship in the past 12 months. Local hospitals provided a list of eligible women based on the Chinese household registrations system (the *hukou*), which excluded women if: 1) they had diagnosed mental or cognitive problems, such as schizophrenia, autism, dementia and mental retardation, which would

impede their abilities to comprehend and answer questions; 2) they were unable to communicate due to being deaf or mute.

Considering rural Chinese women usually have low education or could be illiterate, we provided verbal informed consent without an information sheet. Participants joined the study only when they provided oral consent after being informed of the study purpose during a private, face-to-face interview in their homes; and the interviewer would only start the interview when a spouse, any family members, neighbors or friends of the participant were not at present. We provided participants toiletry items (such as toothpaste and soap) worth 5 Yuan (about 0.8 USD) to compensate them for their time. Additionally, during the interview, we required interviewers to orally provide advice and suggestions on coping strategies to participants who endorsed IPV, including turning to family members and friends for help, searching help from local village committee, women's federation, and civil affairs department, calling police for immediate intervention, and seeing a doctor; we also required interviewers to explain these strategies with phrases that participants could understand. However, we did not deliver advice and suggestions through any physical materials, because we were concerned that the materials may indicate the disclosure of IPV which would irritate perpetrators.

Procedure

We conducted the field survey in July 2012. Local government and Guangyuan Mental Health Center staff assisted us with recruitment. They coordinated with village leaders

and village doctors, and held public information sessions about this study before the survey began. During the field survey, village leaders, doctors and reputable seniors led interviewers door-to-door to conduct the interviews. As some villages have low population density, local residents helped interviewers by transporting them door-to-door on motorcycles. When an eligible participant was not at home, or unavailable, the interviewer would return twice more. Interviewers conducted the surveys on their personal computers during the face-to-face interviews. Interviewers deleted the data their computers after putting the data on the research leader's flash drive.

Measures

Demographic information questionnaire

We designed the demographic questionnaire to collect socio-demographic information from participants. Items included age and education.

Family economic status

The family economic status questionnaire asks about family annual income, family property information, perceived family economic status, family economic status compared with others in the village and compared with previous years.

Information provided about family annual income depended on participants' recall, and was usually an estimation; therefore, we also collected information on property to evaluate participants' economic status. We asked whether a participant's family owned a TV, personal computer, modern kitchen range, mobile phone, DVD/VCD, refrigerator,

sofa, modern living furniture (Western style composite furniture), two wheeled motorized vehicles, three wheeled or above motorized vehicles, air conditioner, washing machine, and bank account with over 10,000 Yuan (about 1,571 USD). We assigned a one for each of the items the participant's family owned, and a zero for those they did not; the score ranged from 0 to 13.

Social support

We applied the 23-item Duke Social Support Index (DSSI) to evaluate participants' social support [23]. The Chinese version has already been used in research, and studies in Chinese rural samples reported internal consistency over 0.79[24 25]. DSSI assesses social interaction, perceived support and instrumental social support. Every answer has an assigned score, and these are added up to determine the total score (possible total scores ranged from 11 to 45); higher scores indicate higher social support levels. Our Cronbach's α was 0.835.

IPV experience

We applied the Short Form of the Revised Conflict Tactics Scale (CTS2S) to investigate participants' IPV experiences, which measures negotiation, psychological aggression, physical assault, injury, and sexual coercion, has acceptable validity and sensitivity [26]. In our previous study, the CTS2S showed good internal reliability and structural validity in rural China [27].

The CTS2S contains statements about participants' experiences during the past year and examines the frequencies of those events. For example, one of the statements is "my

partner pushed, shoved, or slapped me." Participants' answers will be categorized into eight categories: once in the past year, twice in the past year, 3-5 times in the past year, 6-10 times in the past year, 11-20 in the past year, more than 20 times in the past year, not in the past year but it did happen before, and this has never happened. We administered six victimization questions from the survey, across three IPV domains (physical violence, psychological violence, and sexual violence). For this study, we defined the phrase "in the past year" in the CTS2S as in the past 12 months before the survey, and participants were considered positive for IPV if they endorsed any of the six questions. Our Cronbach's α was 0.845.

Quality control

The larger epidemiological study described interview training and quality control measures in detail [20]. Briefly, we recruited interviewers, who could speak and understand local dialect in Guangyuan, from West China School of Public Health of Sichuan University; faculty members from Sichuan University and University of Rochester Medical Center conducted training sessions related to methods, interviewing skills, qualitative methods, and safety regarding IPV identification. Considering rural women in Guangyuan might not speak or understand phrases/expression in "*putonghua* (mandarin)", we required interviewers to explain the study consent, the purpose of the study and the questionnaire including statements and phrases in the CTS2S in local dialect. We deployed three research teams, each had eight interviewers and was led by

experienced senior researchers. Questions were routinely checked for missing items post-interview to reduce missing data issues.

Analysis

Given that several risk factors can influence IPV both separately and collectively and are likely to be highly collinear [3], we used confirmatory factor analysis (CFA). CFA is a type of structural equation modeling (SEM), which allows researchers to determine the underlying structure of a set of observed factors based on *a priori* hypotheses, and to estimate the strength of relationships between latent and observed factors [28 29].

We hypothesized that there were six latent factors including objective economic status, subjective economic status, social support, physical violence, psychological violence, and sexual violence) and two observed factors (including age and education). Factors' labels and assignments are shown in Supplementary Appendix 1.

We have a priori hypotheses based on the social ecological model according to an report on violence and health[30], more specifically they are: 1) age, education, objective economic status, subjective economic status, and social support have direct effects on physical violence, psychological violence and sexual violence; 2) age and education may have indirect effects on physical violence, psychological violence and sexual violence through objective economic status, subjective economic status and social support; 3) objective economic status may have indirect effects on physical violence, psychological violence and sexual violence through subjective economic status and social support.

We ran the analysis with Mplus 7.3. and applied mean and variance-adjusted WLS estimator (WLSMV) as the default estimation method in order to handle categorical continuous variable in Mplus [31]. The default model estimators in WLSMV include chi-square value (χ^2), degrees of freedom (df), χ^2/df, root-mean-squared error of approximation (RMSEA) and its 95% confidence interval (90%CI), comparative fit index (CFI), Tucker-Lewis Index (TLI), and weighted root-mean-square residual (WRMSR). Criteria to assess the model include: the lower chi-square value and degrees of freedom, the better the model; CFI and TLI values should be 0.90 and over; the RMSEA value should be 0.06 and below, the lower limit of 90%CI should be 0 or close to 0, and its upper limit of 90%CI should be 0.08 and below; the value of χ^2/df should be under 5.0 [31] [32].

With respect to age, and consistent with our previous research[19] [20], we categorized participants into six age groups based on frequencies. For educational attainment, we divided participants into five groups. We divided participants into six groups based on family annual income and four groups based on perceived family economic status: affluent, basic needs met, poor, and very poor. We divided participants into three groups based on their family economic status compared with others: wealthier, same, and poorer, and three groups based on their family economic status compared with previous years: better, same, and worse. With respect to perceived health status, we divided participants into four groups: very good, good, average and bad. Finally, we divided participants into five groups based perceived activity status: “normal,” “cannot do heavy

farm work, but can do light farm work," "cannot do any farm work, but can do house work," "cannot do house work but can take care of myself," and "cannot take care of myself." We applied chi-square test and ANOVA for data description, and the statistical significance level was 0.05.

Results

Demographic information

We recruited 1,501 women who were eligible for this study, and all of them completed surveys with a response rate of 100%. However, we found there were 17 participants, 1.13% of total sample, who did not answer to either perceived family financial status, family economic status compared with others or family economic status compared with previous years. Since the 17 participants provided all other demographic information, social support, and IPV experiences, we only exclude them in confirmatory factor analysis.

Participants' age ranged from 16 to 87 years old, with a mean (SD) of 46.44 (13.11) years. Overall, participants were not well educated: 33.11% had never been educated, 41.51% had received primary school education, and only 7.99% had received high school education and above. Most participants' annual family income status was under 40,000 Yuan: 17.65% were under 9,999 Yuan; 24.72% were between 10,000 and 19,999 Yuan; 24.25% were between 20,000 and 29,999 Yuan; and 14.19% were between 30,000 and 39,999 Yuan. Meanwhile, 52.50% felt their family economic status was basic enough, and 31.25% felt it was poor. However, if participants compared their family

economic status to others in the village, 57.16% felt it was the same comparing with that 36.38% felt it was poorer. Most participants, 74.55%, considered their family economic status better than in previous years, compared with 9.13% who considered it worse. With respect to the score of family properties, normality test showed it was negatively skewed distribution with the coefficients of kurtosis and skewness as -0.631 and -0.311; hence, we calculated its range, median and quartile, which were 0 to 13, 8 and 5 respectively. The mean score for DSSI was 37.33±5.13; and the mean scores for social interaction, perceived social support and instrumental social support were 7.81±1.70, 18.89±2.74, and 10.62±2.38 respectively. Details are shown in Table 1.1 and Table 1.2.

Insert Table 1.1 and Table 1.2 here

IPV experience

Participants reported an IPV prevalence rate of 29.05% (436/1501). With respect to physical, psychological and sexual violence, shown in Table 2, the prevalence was 7.66% (115/1501), 26.58% (399/1501) and 3.20% (48/1501) respectively.

The overall IPV prevalence was the highest for women aged 16-29 years old (37.35%), followed by 31.20% for women aged 40-49 years old; it was the lowest for women 70 years old and above. Prevalence rates also differed by education level. The prevalence was the highest (35.33%) for women with junior high school education, followed by 31.82% for women with college education and above, and it was the lowest (24.55%) for women with no education. IPV prevalence rates varied by perceived economic status in this sample. Prevalence was the highest (40.43%) for women whose

perceived family economic status was very poor, followed by 32.20% for women whose perceived family economic status was poor, and it was the lowest (26.14%) for women whose perceived family economic status was basic enough; prevalence was also highest (35.53%) for women whose perceived family economic status was the same as previous years, followed by 31.39% for women whose perceived family economic status was worse than previous years, and it was the lowest (27.61%) for women whose perceived family economic status was better than previous years. The study also found IPV victims had lower total social support levels; the total score of DSSI was 36.28±5.86 for victims, and 37.77±4.74 for non-victims. Victims also had lower perceived and instrumental social support. Details are shown in Table 1 and Table 2.

Insert Table 2 here

Confirmatory factor analysis

Model testing

After seven iterations, we had the best fitting model. In Model 7, the χ^2 was 129.23, the df was50, the χ^2/df was 2.58, the RMSEA was 0.032 and its 95% confident interval (95%CI) was from 0.026 to 0.039, the CFI was 0.991, the TLI was 0.987 and the WRMSR was 1.116. According to the modification indexes, there was no error covariance that could be set as free parameters based on knowledge, hence we chose Model 7 as the final model. Table 3 showed the factor loadings and coefficients of the final model.

Insert Table 3 here

Direct and indirect effects of the final model

The results supported the a priori hypotheses that: 1) social support had direct effects on physical, psychological and sexual violence; 2) objective economic status had indirect effects on physical, psychological and sexual violence through social support; 3) education had indirect effect on psychological violence through social support and objective economic status. Table 3 and Figure 2 show the effects.

As displayed in Table 4, we found that: 1) as education increased 1 unit, the risk for psychological violence decreased 0.056; 2) as economic status increased 1 unit, the risk for physical, psychological and sexual violence indirectly decreased 0.047, 0.014 and 0.047 units respectively, but the total effects were not significant; 3) as social support increased 1 unit, the risk for physical, psychological and sexual violence decreased 0.12, 0.35 and 0.12 units respectively.

Insert Table 4 and Figure 2 here.

Discussion

IPV is well-recognized as an important global health challenge, but it is not yet well understood in China, particularly given the wide variability in reported prevalence. The variability in earlier work may be attributed to the deep cultural roots that may impede accurate reporting, methods in the relatively scant research that has already been done, and the geographic variation among different studies.

The prevalence rates from studies focusing on rural Chinese women experiencing IPV were not consistent. A study focusing on married women under 37 years old in central

China reported that the total lifetime IPV prevalence was 7.3%, the prevalence of minor and severe physical violence was 6.4% and 5.8%, and the prevalence of psychological an sexual violence were 3% and 1% respectively[33 34]; another study in north China, reported that the prevalence of physical, psychological and sexual violence among women were 12.4%, 20.6% and 11.2% [35]. Comparing with these studies, our results did not fully support the hypothesis that the prevalence was lower in Guangyuan than that in north China. The prevalence of psychological violence was higher in Guangyuan. However our results were close to Gao and Tamara 's study in Ning Xia, the northwest of China, which reported the prevalence of physical, psychological and sexual violence was 4.4%, 23.9% and 1.1% [36].

There may be two possible explanations for the variability. First, studies were conducted in different areas of China, where differences in local cultural context and economic development may impact attitudes towards violence against women. Thus, in some cases, victims may perceive their experiences of violence as normal and/or private, resulting in response bias. Traditional Chinese practices, influenced by Confucian doctrine, emphasize the inferior social status of women. A famous Confucian doctrine states that there are three kinds of obedience for women: "*San Cong"* (obeying your father before you are married, obeying your husband during marriage, and obeying your sons after your husband dies), "*Si De*" (four kinds of virtues including fidelity, tidiness, propriety in speech and commitment to needle work) [34 37]. During our CTS2S assessments, several women cited these Confucian credos, when asked about hitting or

fighting, to rationalize violent behaviors as their punishment for failing to obey their husbands or partners. Hence, we can expect that the deeper traditional culture roots, the more underestimated IPV prevalence will be. Second, different studies applied varied research tools such as the Abuse Assessment Screen, the Conflict Tactics Scale, the Revised Conflict Tactics Scale, the Composite Abuse Scale, and self-designed questionnaires or items. The difference in sensitivities and specificities of these tools could account for variability in rates. Despite lower prevalence rates than expected, our findings here revealed important risk and protective factors for IPV among rural Chinese women.

This study also confirmed findings from previous studies suggesting that social support is an important protective factor for IPV against women. Several considerations may explain the association. First, social support is often a source of empowerment for women [38]. For example, an ethnographic study revealed that attending social activities could increase women's influence and prestige, and, in turn, decrease the risk for IPV [39]. Similarly, another anthropological study suggested that the more social support women have, the greater their social resources, and the more they pay attention to their rights [40]. Women with higher social support might decide to end the violent relationships and decrease their risks [40]. Second, perpetrators' controlling behaviors usually limit victims' interactions with other people, isolate victims, lower their social support level, and eventually lead to an increase of IPV risk and a vicious cycle [41]. Third, social support will buffer the negative and traumatic experience victims have been through. The Buffer

Theory suggests that social support can buffer adverse life events and the negative impacts; individuals with high social support levels thus could cope with adverse events well and maintain physical and mental wellness [42]. In a 2002 study, Ann Coker and colleagues reported that, among American female IPV victims aged 18 to 65 years old, victims with high social support had greater perceptions of their mental health, better physical health, lower prevalence of depression, anxiety, suicidal ideation and post-traumatic stress disorder (PTSD) [43].

Unlike social support, the association between sociodemographic factors and IPV are not consistent with previous studies. We did not find a significant relationship between age and IPV, but other studies have shown that younger age is a risk factor for both male perpetrators' violent behaviors and female victims' violent experiences [44-48]. This study found that the higher education level rural women had, the lower their risk for psychological violence, which was consistent with other studies [13 49 50]. Though education level had insignificant effects on physical and sexual violence in this study, we attributed this to the fact that the prevalence of physical and sexual violence was lower than psychological violence in this sample. The sample also had a low proportion of women with a relatively high education level; only 120 women received high school education and above.

This study found an indirect relationship between objective economic status and IPV. This relationship remains unsettled in current literature. Some studies reported that low family economic status was a critical risk factor for male to female violence [45]. Faced

with the stress of poverty, males are more likely to use violent behaviors as a solution to release pressure [38]. However, a study in South Africa reported that extremely poor family economic status protects women from IPV [51]. Other studies have reported that, compared with objective family economic status, the contribution women made to family income was a more important factor—women who made little contribution or were totally dependent on their partners faced increasing risk of IPV [34 38 50 52].

We recognize several limitations. As a cross-sectional field study, interviewers were only able to recruit residents at home during the survey days; thus, some who had day-jobs may have been missed. As China has a vast territory and many nationalities, rural women in different areas face various living environments, cultural backgrounds and customs in which attitudes towards IPV may vary; hence we must be cautious to generalize our results. We didn't investigate the relationship between IPV and other important factors including childhood maltreatment, marital satisfaction and education disparity between couples, and women's financial contributions to their families. Therefore, we encourage future research to investigate these factors and their relationships with IPV, to fully understand IPV against women in China, so as to develop and implement effective interventions. And lastly, it was possible that cultural barriers, those Confusion credos, prevented women from sharing their stories. Another traditional Chinese expression worth mentioning is "*Jia chou bu ke wai yang*," which means one should not reveal family disgrace to outsiders [53-56]. It is possible that the belief in this notion of family disgrace could lead some participants to intentionally

under-report male-to-female violence.

Conclusion

Findings from this study indicate that the overall IPV prevalence in Guangyuan rural areas is close to that in northwest of China. And we found personal and interpersonal factors, especially social support, were important to IPV. In 2016, China has implemented its first law against violence, which emphasizes global responsibility of different societal sectors to stop violence, including government departments, judiciary authorities, non-governmental organizations, enterprises and institutions, and the citizens. We suggest future work is needed to create, disseminate and test potential IPV interventions focusing on building social support network cross different societal sectors and increasing individuals' perceived social support level to ameliorate the morbidity and mortality associated with IPV.

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Conflict of interest

The authors declare that they have not conflict of interest.

Ethical Statement

The Ethics Committee of Sichuan University reviewed and approved the protocol,

including the verbal informed consent process (NO.2011004-1). The University of Rochester Research Subjects Review Board reviewed the approval from Sichuan University and approved analyses of de-identified data.

Contribution

FH designed the survey instruments, implemented the field survey, monitored data collection, cleaned the data, developed the plan for analysis, analyzed the data, drafted and revised the paper. CC designed the survey instruments, trained interviewers, assisted with the analysis plan, revised the paper, and supervised FH. MNW designed the survey instruments, trained interviews, and revised the paper. EDC initiated the project, revised the paper, and supervised FH. PQ initiated the project, designed the survey instruments, monitored data collection, cleaned the data, and revised the paper. All authors had full access to all the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis. All authors read and approved the final manuscript.

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Data sharing statement

The data set is available from the corresponding author at qiupeiyuan@scu.edu.cn.

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1 2011;39(4):299-306.

Table 1.1 Demographic information of participants

Demographic Characters		n	IPV victim		Prevalence (%)	χ^2	*p*
			No	Yes			
Age	16-29	204	127	77	37.75	19.873	0.001
	30-39	225	159	66	29.33		
	40-49	468	320	146	31.20		
	50-59	364	276	88	24.18		
	60-69	188	138	50	26.60		
	70-	52	45	7	13.46		
Education	Never educated	497	375	122	24.55	11.378	0.023
	Primary school	623	442	181	29.10		
	Junior high school	283	183	100	35.33		
	High school	98	50	26	26.53		
	College and above	22	15	7	31.82		
Family annual income	0-9999 Yuan	265	194	71	26.79	3.237	0.663
	10000-19999 Yuan	371	263	108	29.11		
	20000-29999 Yuan	346	248	98	28.32		
	30000-39999 Yuan	213	152	61	28.64		
	40000-49999 Yuan	116	83	33	28.45		
	≥50000 Yuan	190	125	65	34.21		
Perceived family financial status*	Affluent	182	124	58	31.87	9.091	0.028
	Basic enough	788	582	206	26.14		
	Difficult	469	318	151	32.20		
	Very difficult	47	28	19	40.43		
Comparing with others*	Wealthier	81	62	19	23.46	1.363	0.506
	Same	858	606	252	29.37		
	Poorer	546	384	162	29.67		
Comparing with previous years*	Better	1119	810	309	27.61	6.095	0.047
	Same	228	147	81	35.53		
	Worse	137	94	43	31.39		

Note: "*" indicates missing data; "#" indicates using Fisher exact test; "IPV" is the abbreviation of intimate partner violence.

Table 1.2 The social support level of participants

Social support	Mean	IPV victim		F	*p*
		No	Yes		
Total score	37.33±5.13	37.77±4.74	36.28±5.86	26.289	0.000
Social interaction	7.81±1.70	7.82±1.70	7.81±1.68	0.002	0.962
Perceived social support	18.89±2.74	19.15±2.58	18.24±3.00	35.154	0.000
Instrumental social support	10.62±2.38	10.78±2.18	10.23±2.77	16.778	0.000
Family properties	7.54±2.97	7.50±2.93	7.63±3.05	0.604	0.437

Note: "IPV" is the abbreviation of intimate partner violence.

Table 2 IPV experiences of participants

IPV experiences	No (%)	Yes (%)
Ever experienced in the past 12 months	1065 (70.95%)	436 (29.05%)
Physical violence	1386 (92.34%)	115 (7.66%)
Psychological violence	1102 (73.42%)	399 (26.58%)
Sexual violence	1453 (96.80%)	48 (3.20%)

Note: "IPV" is the abbreviation of intimate partner violence.

Table 3 Factor loadings and path coefficients of the final model

Model	Dependent variables	Independent variables	Statistics results	
			Standardized coefficient	*p*
Measurement model	OE	A3	0.61	0.00
		A4	0.79	0.00
	PHV	C1	0.84	0.00
		C2	0.98	0.00
	PSV	C3	0.45	0.00
		C4	0.71	0.00
	SV	C5	0.76	0.00
		C6	0.65	0.00
	SS	D1	0.55	0.00
		D2	0.42	0.00
		D3	0.40	0.00
Structure model	PHV	SS	-0.12	0.005
		OE	0.060	0.14
	PSV	SS	-0.35	0.00
		OE	0.11	0.060
	SV	SS	-0.12	0.021
		OE	0.062	0.11
	OE	A1	-0.18	0.00
		A2	0.30	0.00
	SS	A1	-0.068	0.18
		A2	0.13	0.012
		OE	0.41	0.00
Factor related	PSV	PHV	0.91	0.00
	SV	PHV	0.30	0.00
		PSV	0.46	0.00
	C5	C1	0.31	0.00
	D3	D2	0.41	0.00

Note: OE=Objective economic status; SS=Social support; PHV=Physical violence; PSV= Psychological violence; SV=Sexual violence; A1=Age; A2=Education; B1=Family annual income; B2=Family properties; C1= Being pushed, shoved or slapped; C2=Being punched, kicked or beat-me-up; C3=Being insulted, swore, shouted, yelled at; C4= Being threatened to destroy belongings; C5= Sex against will with physical force; C6= Sex against will without physical force; D1=Social interaction; D2=Perceived social support; D3=Instrumental social support.

Table 4 Direct and indirect effects of the final model

Factors	Physical violence			Psychological violence			Sexual violence		
	Direct effect	Indirect effect	Total effect	Direct effect	Indirect effect	Total effect	Direct effect	Indirect effect	Total effect
Age	——	0.005	0.005	——	0.030	0.030	——	0.005	0.005
Education	——	-0.011	-0.011	——	-0.056*	-0.056*	——	-0.011	-0.011
Objective economic status	0.060	-0.047*	0.013	0.11	-0.014*	-0.033	0.062	-0.047*	0.015
Social support	-0.12*	——	-0.12*	-0.35*	——	-035*	-0.12*	——	-0.12*

Note: "*" indicates $p<0.05$.

Figure 1 The socio-ecological model of risk factors of IPV

Figure 2 The final confirmatory factor analysis model

Note: OE=Objective economic status; SS=Social support; SE= Subjective economic status; PHV=Physical violence; PSV= Psychological violence; SV=Sexual violence; A1=Age; A2=Education; A3=Family annual income; A3=Family properties; C1= Being pushed, shoved or slapped; C2=Being punched, kicked or beat-me-up; C3=Being insulted, swore, shouted, yelled at; C4= Being threatened to destroy belongings; C5= Sex against will with physical force; C6= Sex against will without physical force; D1=Social interaction; D2=Perceived social support; D3=Instrumental social support

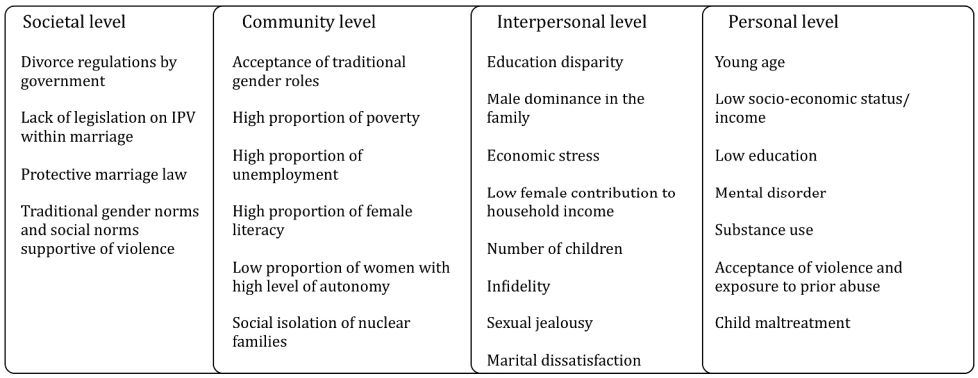

Figure 1 The socio-ecological model of risk factors of IPV

303x121mm (300 x 300 DPI)

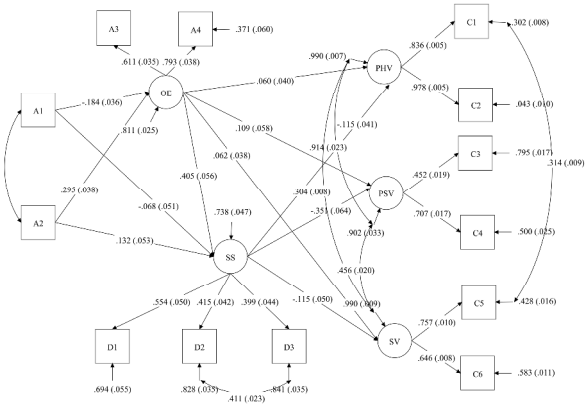

Figure 2 The final confirmatory factor analysis model

499x240mm (300 x 300 DPI)

Appendix 1 Latent and observation factors

Latent factors	Observed factors
	Age, A1
	Education, A2
Objective economic status, OE	Family annual income, A3
	Family properties, A4
Subjective economic status, SE	Perceived family financial status, B1
	Comparing with others, B2
	Comparing with previous years, B3
Physical violence, PHV	Being pushed, shoved or slapped, C1
	Being punched, kicked or beat-me-up, C2
Psychological violence, PSV	Being Insulted, swore, shouted, yelled at, C3
	Being threatened to destroy belongings, C4
Sexual violence, SV	Sex against will with physical force, C5
	Sex against will without physical force, C6
Social support, SS	Social interaction, D1
	Perceived social support, D2
	Instrumental social support, D3

STROBE Statement—checklist of items that should be included in reports of observational studies

	Item No	Recommendation	Page number
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	1
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	2,3
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	5
Objectives	3	State specific objectives, including any prespecified hypotheses	7,8
Methods			
Study design	4	Present key elements of study design early in the paper	8
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	8
Participants	6	(*a*) *Cohort study*—Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up *Case-control study*—Give the eligibility criteria, and the sources and methods of case ascertainment and control selection. Give the rationale for the choice of cases and controls *Cross-sectional study*—Give the eligibility criteria, and the sources and methods of selection of participants	8,9
		(*b*) *Cohort study*—For matched studies, give matching criteria and number of exposed and unexposed *Case-control study*—For matched studies, give matching criteria and the number of controls per case	-
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	10-12
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	10-12
Bias	9	Describe any efforts to address potential sources of bias	21
Study size	10	Explain how the study size was arrived at	8
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	13,14
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	12-14
		(*b*) Describe any methods used to examine subgroups and interactions	No applicable
		(*c*) Explain how missing data were addressed	14
		(*d*) *Cohort study*—If applicable, explain how loss to follow-up was addressed *Case-control study*—If applicable, explain how matching of cases and controls was addressed *Cross-sectional study*—If applicable, describe analytical methods taking account of sampling strategy	8
		(*e*) Describe any sensitivity analyses	No applicable

Continued on next page

Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	14
		(b) Give reasons for non-participation at each stage	21
		(c) Consider use of a flow diagram	-
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	14, 15
		(b) Indicate number of participants with missing data for each variable of interest	14
		(c) *Cohort study*—Summarise follow-up time (eg, average and total amount)	-
Outcome data	15*	*Cohort study*—Report numbers of outcome events or summary measures over time	-
		Case-control study—Report numbers in each exposure category, or summary measures of exposure	-
		Cross-sectional study—Report numbers of outcome events or summary measures	15,16
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	No applicable
		(*b*) Report category boundaries when continuous variables were categorized	14, 15
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	No applicable
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	No applicable
Discussion			
Key results	18	Summarise key results with reference to study objectives	17-21
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	21
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	17-21
Generalisability	21	Discuss the generalisability (external validity) of the study results	21, 22
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	22

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

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Using Confirmatory Factor Analysis to Explore Associated Factors of Intimate Partner Violence in a Sample of Chinese Rural Women: A Cross-sectional Study

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Using Confirmatory Factor Analysis to Explore Associated Factors of Intimate Partner Violence in a Sample of Chinese Rural Women: A Cross-sectional Study

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Abstract

Objectives

To estimate the prevalence of intimate partner violence (IPV) among a sample of rural Chinese women and to explore associated factors.

Design

Cross-sectional study

Setting

Rural areas of Guangyuan city, Sichuan, China.

Participants

We recruited 1501 women, ages 16 years and older, who lived locally for at least 2 years and reported being married or in a relationship during the past 12 months. They were among a larger sample 1898 potential participants from our larger parent study on the prevalence of depressive-distressed symptoms.

Methods

Participants completed demographic and social economic measures, the Short Form of the Revised Conflict Tactics Scale, and the Duke Social Support Index. We applied chi-square test, ANOVA and confirmatory factor analysis for analysis.

Results

The overall prevalence of IPV in the past 12 months was 29.05%; the prevalence of physical, psychological, and sexual violence was 7.66%, 26.58%, and 3.20%, respectively. The overall prevalence was highest among women ages 16 to 29 years,

and was more common among those without a high school diploma and who saw their family's financial status as very poor or stagnant. Women who were not victims of IPV had higher levels of social support.

Confirmatory factor analysis showed that the total effects of social support on physical, psychological and sexual violence was -0.12, -0.35 and -0.12, respectively. The indirect effects of objective economic status on physical, psychological and sexual violence was -0.047, -0.014 and -0.047, respectively, but the total effect was not significant. The indirect effect of education on psychological violence was -0.056.

Conclusion

IPV is common in rural Guangyuan. Our data are comparable to findings from Northwest of China. Social support is an important protective factor. Future work is needed to develop, test, and later disseminate potential IPV interventions, with a focus on building actual and perceived supportive social networks.

Keywords

Intimate partner violence; Violence against women; Rural Chinese women; Social support;

Strength and limitations

1. Strengths of this study are that it is the first population-based study in this rural region to estimate the prevalence and associated factors of IPV including physical,

psychological and sexual violence among women who were married or in a relationship during the past 12 months.

2. We applied confirmatory factor analysis to explore associated factors of IPV, which could reveal the underlying structure of observed factors and estimate the strength of relationships between latent and observed factors.
3. We might miss residents who had day-jobs and were not at home; we did not investigate factors including child maltreatment, marital dissatisfaction, and education disparity between couples, and women's financial contributions to their families, which could be important factors associated with IPV.
4. Cultural barriers could prevent women from reporting victimized experiences.
5. Due to China's vast territory and diverse nationalities of China, we must be cautious generalizing these results.

Introduction

Intimate partner violence (IPV), and violence against women in particular, is a prevalent and global public health concern[1]. The World Health Organization (WHO) reports four types of IPV including physical violence, psychological violence, sexual violence, and controlling behaviors; and victims may experience different types of violence at a same time [2]. A large WHO multi-country study reported lifetime rates of physical and sexual violence by an intimate partner ranged from 13% to 61% and 6% to 59% respectively[1 3].

Although much is known about IPV worldwide, very little is known about its occurrence in China. Since 2000, Hong Kong researchers have published myriad articles focusing on child abuse[4], incest, [5]and the emergence of non-governmental entities to address violence against women [6]. In contrast, research on violence against women in Mainland China remains nascent. A 2004 study examined data from the 1999-2000 Chinese Health and Family Life Survey and reported among adults, ages 20 to 64 years, 34% of women were hit during their current relationship and 19% of respondents reported male-to-female IPV[7]. Other studies were conducted in urban medical settings. For example, Xiao and colleagues surveyed 600 women in an urban outpatient gynecology clinic and found 43% reported lifetime violence (including physical violence, sexual violence, or both), placing them squarely in the mid-range when compared to international communities [8]. A recent multi-country study, including the USA, India, Nigeria, South Africa and China, reported that the IPV rate during the past year was 10.2% among ever-partnered women in Shanghai [9]. Pan Teng and colleagues recruited

1,368 women in Guangzhou and reported the prevalence of IPV over the past year was 39.2% for local women and 41.2% for migrant women [10].

Compared to studies in urban settings, few studies discuss IPV against women living in rural China. A study based on 3,998 married women, rural Chinese women reported prevalence for IPV in past-year was 65.0%, and the prevalence for physical, psychological and sexual violence was 29.8%, 58.3% and 16.9% respectively[11]. However, when compared to a community-based survey that sampled patients from urban, rural and industrial areas in Hunan, the lifetime reported rate of IPV was 12.4%, 3.3% and 14.5% respectively [12]. It is unclear whether such discrepancies accurately reflect true differences or variations in sampling, measures, reporting, and other social factors that can impede valid epidemiological assessments.

In addition to variable prevalence rates, there is a dearth of information about common IPV risk factors in rural Chinese settings. Though little is known about the risk factors specifically associated with IPV in rural China, there have been many studies across cultures, not specific to female victimization, that provide some clues. Commonly reported IPV risk factors include young age, low education, low socio-economic status/income, substance use, male dominance in the family, infidelity, high proportion of neighborhood poverty, acceptance of violence and divorce regulations by the government[2 3 13-16]. The purpose of this paper is to explore these risk factors among a sample of rural Chinese women living in Sichuan province. We use the social ecological model to contextualize commonly studied risk factors within a framework (see Figure 1)

and to generate hypotheses regarding IPV risk factors [17].

Insert Figure 1 here.

In light of China's extraordinary economic transformation and the major social changes that are sweeping across rural regions of the country, we see a need for further studies of IPV. Family structures and roles are changing rapidly, with unmatched levels of internal workforce migration from west to east and inland rural to urban coastal regions. This "floating population" predominately includes men [18]; consequently, the term "left-behind" implies too much homogeneity among the women, elders, and children who do not migrate for work, and it denotes populations that have emerged during the past two decades. Among the "left-behind" population, most of them are rural women who devote themselves to family responsibilities. However, we have little understanding about how these dramatic changes have affected these women of common social and interpersonal problems such as IPV.

Based on data collected from the rural areas of Guangyuan City in northern Sichuan Province, we estimated the prevalence of IPV. We also tested whether the prevalence would be lower in Guangyuan region than in rural areas of northern China, where IPV against women has been described as an acceptable aspect of regional culture[11]. We also examined associated factors, hypothesizing that measures sensitive to personal and interpersonal levels of the social ecological model will have a direct influence on IPV.

Method

This study is part of a larger epidemiological study conducted in rural areas of Guangyuan City in Sichuan province in July 2012. The larger study assessed the prevalence of distress and diagnosed psychopathology among rural women, and explored how women understand their conditions[19 20]. Guangyuan City is located in the north of Sichuan, a southwestern province in China, with approximately 820,000 people in urban areas and 1.66 million in rural areas[21]. Of noted, a "city" in China is most often comprised of multiple regions including counties, towns, villages, and rural areas. Of note, the Guangyuan region of Sichuan Province, especially its rural towns and villages in mountainous areas, was stricken by the 2008 Wenchuan earthquake. This regional area is economically underdeveloped with a 2010 net per capita net household income of 4035.5 yuan (USD$585.3), one of the lowest in the province and the country [22].

Participants

The sampling strategy is discussed in greater detail elsewhere[20]. We recruited a socio-economically diverse sample and used multi-stage sampling to randomly select towns and villages for this study. We included all women, ages 16 years and older (16 years is the age of consent in China), who had lived locally for at least 2 years and reported being married or in a relationship during the past 12 months. Local hospitals provided a list of eligible women based on the Chinese household registrations system (the *hukou*), which excluded women if: 1) they had diagnosed mental or cognitive problems, such as schizophrenia, autism, dementia and mental retardation, which would

impede their abilities to comprehend and answer questions; 2) they were unable to communicate due to being deaf or mute.

This study was reviewed and approved by the Ethics Committee of Sichuan University and the University of Rochester Research Subjects Review Board. To ascertain informed consent among these women, with many having low educational levels and a substantial proportion with functional illiteracy, we conducted a verbal consent with language attuned to participants needs and without a written information sheet. This process did not begin until the potential participants was alone. We insisted that spouse, family members, neighbors, or friends of the participant were not present before beginning face-to-face interviews. We provided participants toiletry items (such as toothpaste and soap) worth 5 yuan (about USD$0.80) to compensate them for their time. If the participant reported any affirmative response regarding IPV, interviewers provided oral advice and suggestions on coping strategies to participants who endorsed IPV, including turning to family members and friends for help, searching help from the local village committee, women's federation, or civil affairs department, calling police for immediate intervention, and seeing a doctor. We also trained interviewers to explain these strategies with simple phrases that participants could understand. However, we did not provide any physical brochures or other materials, as these materials may have indicated the disclosure of IPV, which potentially could provoke perpetrators.

Procedure

We conducted the field survey in July 2012. Local government and Guangyuan Mental Health Center staff assisted us with recruitment. They coordinated with village leaders and village doctors, and held public information sessions about this study before the survey began. During the field survey, village leaders, doctors and reputable seniors led interviewers door-to-door to conduct the interviews. As some villages have low population density, local residents helped interviewers by transporting them door-to-door on motorcycles. When an eligible participant was not at home, or unavailable, the interviewer would return twice more. Interviewers conducted the surveys on their personal computers during the face-to-face interviews. Interviewers deleted the data their computers after putting the data on the research leader's flash drive.

Measures

Demographic information questionnaire

We designed the demographic questionnaire to collect socio-demographic information from participants. Items included age and education.

Family economic status

The family economic status questionnaire asks about family annual income, family property information, perceived family economic status, family economic status compared with others in the village and compared with previous years.

Information provided about family annual income depended on participants' recall, and was usually an estimation; therefore, we also collected information on property to

evaluate participants' economic status. We asked whether a participant's family owned a TV, personal computer, modern kitchen range, mobile phone, DVD/VCD, refrigerator, sofa, modern living furniture (Western style composite furniture), two wheeled motorized vehicles, three wheeled or above motorized vehicles, air conditioner, washing machine, and bank account with over 10,000 Yuan (about 1,571 USD). We assigned a one for each of the items the participant's family owned, and a zero for those they did not; the score ranged from 0 to 13.

Social support

We applied the 23-item Duke Social Support Index (DSSI) to evaluate participants' social support [23]. The Chinese version has already been used in research, and studies in Chinese rural samples reported internal consistency over 0.79[24 25]. DSSI assesses social interaction, perceived support and instrumental social support. Every answer has an assigned score, and these are added up to determine the total score (possible total scores ranged from 11 to 45); higher scores indicate higher social support levels. Our Cronbach's α was 0.835.

IPV experience

We applied the Short Form of the Revised Conflict Tactics Scale (CTS2S) to investigate participants' IPV experiences, which measures negotiation, psychological aggression, physical assault, injury, and sexual coercion, has acceptable validity and sensitivity [26]. In our previous study, the CTS2S showed good internal reliability and structural validity in rural China [27].

The CTS2S contains statements about participants' experiences during the past year and examines the frequencies of those events. For example, one of the statements is "my partner pushed, shoved, or slapped me." Participants' answers were categorized into eight categories: once in the past year, twice in the past year, 3-5 times in the past year, 6-10 times in the past year, 11-20 in the past year, more than 20 times in the past year, not in the past year but it did happen before, and this has never happened. We administered six victimization questions across three IPV domains (physical violence, psychological violence, and sexual violence). For this study, we defined the phrase "in the past year" in the CTS2S as occurring during the 12 months preceding the survey, and participants were considered positive for IPV if they endorsed any of the six questions. Our Cronbach's α was 0.845.

Quality control

The larger epidemiological study described interview training and quality control measures in detail [20]. Briefly, we recruited interviewers who could speak and understand the local dialect in Guangyuan from the West China School of Public Health of Sichuan University. Faculty from Sichuan University and University of Rochester Medical Center conducted training sessions related to methods, interviewing skills, qualitative methods, and safety regarding IPV identification. Considering that many women in Guangyuan might not speak or understand phrases/expression in *putonghua* (mandarin)", we required interviewers to explain the study consent, the purpose of the study and the questionnaire including statements and phrases in the CTS2S in local

dialect. We deployed three research teams, each had eight interviewers and was led by experienced senior researchers. Questions were routinely checked for missing items post-interview to reduce missing data issues.

Analysis

Given that several risk factors can influence IPV both separately and collectively and are likely to be highly collinear [3], we used confirmatory factor analysis (CFA). CFA is a type of structural equation modeling (SEM), which allows researchers to determine the underlying structure of a set of observed factors based on *a priori* hypotheses, and to estimate the strength of relationships between latent and observed factors [28 29].

We hypothesized that there were six latent factors including objective economic status, subjective economic status, social support, physical violence, psychological violence, and sexual violence) and two observed factors (including age and education). Factors' labels and assignments are shown in Supplementary Appendix 1.

We had *a priori* hypotheses based on the social ecological model according to an report on violence and health[30], more specifically they were: 1) age, education, objective economic status, subjective economic status, and social support would have direct effects on physical violence, psychological violence and sexual violence; 2) age and education would have indirect effects on physical violence, psychological violence and sexual violence through objective economic status, subjective economic status and social support; 3) objective economic status would have indirect effects on physical violence,

psychological violence and sexual violence through subjective economic status and social support.

We ran the analysis with Mplus 7.3. and applied mean and variance-adjusted WLS estimator (WLSMV) as the default estimation method in order to handle categorical continuous variable in Mplus [31]. The default model estimators in WLSMV included chi-square value (χ^2), degrees of freedom (df), χ^2/df, root-mean-squared error of approximation (RMSEA) and its 95% confidence interval (90%CI), comparative fit index (CFI), Tucker-Lewis Index (TLI), and weighted root-mean-square residual (WRMSR). Criteria to assess the model included: the lower chi-square value and degrees of freedom, the better the model; CFI and TLI values should be 0.90 and over; the RMSEA value should be 0.06 and below, the lower limit of 90%CI should be 0 or close to 0, and its upper limit of 90%CI should be 0.08 and below; the value of χ^2/df should be under 5.0 [31 32].

With respect to age, and consistent with our previous research[19 20], we categorized participants into six age groups based on frequencies. For educational attainment, we divided participants into five groups based on the hierarchy of Chinese education system. We divided participants into six groups based on family annual income and four groups based on perceived family economic status: affluent, basic needs met, poor, and very poor. We divided participants into three groups based on their family economic status compared with others: wealthier, same, and poorer, and three groups based on their family economic status compared with previous years: better, same, and worse.

With respect to perceived health status, we divided participants into four groups: very good, good, average and bad. Finally, we divided participants into five groups based perceived activity status: “normal,” “cannot do heavy farm work, but can do light farm work,” “cannot do any farm work, but can do house work,” “cannot do house work but can take care of myself,” and “cannot take care of myself.” We applied chi-square test and ANOVA for data description, and the statistical significance level was 0.05.

Results

Demographic information

For this aspect of our larger study, we recruited 1,501 of a potential 1898 women who were eligible for this study; all who consented completed their surveys. However, we found there were 17 participants (1.13% of the total) did not answer items related to perceived family financial status, family economic status compared with others, or family economic status compared with previous years. Since the 17 participants provided all other demographic information, social support, and IPV experiences, we only excluded them in confirmatory factor analysis.

Participants' age ranged from 16 to 87 years old, with a mean (SD) of 46.44 (13.11) years. Overall, participants were not well educated: 33.11% had never been educated, 41.51% had received primary school education, and only 7.99% had received high school education and above. Most participants’ annual family income status was under 40,000 Yuan: 17.65% were under 9,999 Yuan; 24.72% were between 10,000 and 19,999 Yuan; 24.25% were between 20,000 and 29,999 Yuan; and 14.19% were between

30,000 and 39,999 Yuan. Meanwhile, 52.50% felt their family economic status was basic enough, and 31.25% felt it was poor. However, if participants compared their family economic status to others in the village, 57.16% felt it was the same comparing with that 36.38% felt it was poorer. Most participants, 74.55%, considered their family economic status better than in previous years, compared with 9.13% who considered it worse. With respect to the score of family properties, normality test showed it was negatively skewed distribution with the coefficients of kurtosis and skewness as -0.631 and -0.311; hence, we calculated its range, median and quartile, which were 0 to 13, 8 and 5 respectively. The mean score for DSSI was 37.33±5.13; and the mean scores for social interaction, perceived social support and instrumental social support were 7.81±1.70, 18.89±2.74, and 10.62±2.38 respectively. Details are shown in Table 1.1 and Table 1.2.

Insert Table 1.1 and Table 1.2 here

IPV experience

Participants reported an IPV prevalence rate of 29.05% (436/1501). With respect to physical, psychological and sexual violence, shown in Table 2, the prevalence was 7.66% (115/1501), 26.58% (399/1501) and 3.20% (48/1501) respectively.

The overall IPV prevalence was the highest for women aged 16-29 years old (37.35%), followed by 31.20% for women aged 40-49 years old; it was the lowest for women 70 years old and above. Prevalence rates also differed by education level. The prevalence was the highest (35.33%) for women with junior high school education, followed by 31.82% for women with college education and above, and it was the lowest

(24.55%) for women with no education. IPV prevalence rates varied by perceived economic status in this sample. Prevalence was the highest (40.43%) for women whose perceived family economic status was very poor, followed by 32.20% for women whose perceived family economic status was poor, and it was the lowest (26.14%) for women whose perceived family economic status was basic enough; prevalence was also highest (35.53%) for women whose perceived family economic status was the same as previous years, followed by 31.39% for women whose perceived family economic status was worse than previous years, and it was the lowest (27.61%) for women whose perceived family economic status was better than previous years. The study also found IPV victims had lower total social support levels; the total score of DSSI was 36.28±5.86 for victims, and 37.77±4.74 for non-victims. Victims also had lower perceived and instrumental social support. Details are shown in Table 1 and Table 2.

Insert Table 2 here

Confirmatory factor analysis

Model testing

After seven iterations, we had the best fitting model. In Model 7, the χ^2 was 129.23, the df was50, the χ^2/df was 2.58, the RMSEA was 0.032 and its 95% confident interval (95%CI) was from 0.026 to 0.039, the CFI was 0.991, the TLI was 0.987 and the WRMSR was 1.116. According to the modification indexes, there was no error covariance that could be set as free parameters based on knowledge, hence we chose Model 7 as the final model. Table 3 showed the factor loadings and coefficients of the final model.

Insert Table 3 here

Direct and indirect effects of the final model

The results supported our *a priori* hypotheses that: 1) social support had direct effects on physical, psychological and sexual violence; 2) objective economic status had indirect effects on physical, psychological and sexual violence through social support; 3) education had indirect effect on psychological violence through social support and objective economic status. Table 3 and Figure 2 show the effects.

As displayed in Table 4, we found that: 1) as education increased 1 unit, the risk for psychological violence decreased 0.056; 2) as economic status increased 1 unit, the risk for physical, psychological and sexual violence indirectly decreased 0.047, 0.014 and 0.047 units respectively, but the total effects were not significant; 3) as social support increased 1 unit, the risk for physical, psychological and sexual violence decreased 0.12, 0.35 and 0.12 units respectively.

Insert Table 4 and Figure 2 here.

Discussion

IPV is well-recognized as an important global health challenge, but it has not been well-studied or well-understood in China, particularly given the wide variability in reported prevalence. This variability may reflect: deeply ingrained cultural practices that may impede accurate reporting, inadequately developed research or survey methods and limited samples involved in past studies, and substantial geographic and social

variations among those samples that have been involved in the past.

The prevalence rates from studies focusing on rural Chinese women experiencing IPV have not been consistent. A study focusing on married women under 37 years old in central China reported that the total lifetime IPV prevalence was 7.3%, with a prevalence of minor and severe physical violence as 6.4% and 5.8%, respectively, and the prevalence of psychological and sexual violence were 3% and 1%, respectively[33 34]. A study from north China reported that the respective prevalence of physical, psychological and sexual violence among women were 12.4%, 20.6%, and 11.2% [35]. Our results did not fully support the expect finding that the prevalence of IPV was lower in Guangyuan as compared to results from northern China. The prevalence of psychological violence was higher in Guangyuan. Our results were close to those from Gao and Tamara 's study in Ning Xia, the northwest of China, which reported the prevalence of physical, psychological and sexual violence was 4.4%, 23.9% and 1.1% [36].

There may be two possible explanations for the variability. First, studies were conducted in different areas of China, where differences in local cultural context and economic development may impact attitudes towards violence against women. In some cases, victims may perceive their experiences of violence as normative or private, resulting in response bias. Traditional Chinese practices, influenced by Confucian doctrine, emphasize the inferior social status of women. A famous Confucian doctrine states that there are three kinds of obedience for women, "*San Cong"* (obeying your father before you are married, obeying your husband during marriage, and obeying your

sons after your husband dies), and four kinds of virtue, "*Si De*" (fidelity, tidiness, propriety in speech and commitment to needle work) [34 37]. During our CTS2S assessments, several women cited these Confucian credos when asked about hitting or fighting, to rationalize violent behaviors as their punishment for failing to obey their husbands or partners. Hence, we can expect that the deeper traditional culture roots, the more underestimated IPV prevalence will be. Second, different studies applied varied research tools such as the Abuse Assessment Screen, the Conflict Tactics Scale, the Revised Conflict Tactics Scale, the Composite Abuse Scale, and self-designed questionnaires or items. The difference in sensitivities and specificities of these tools could account for variability in rates. Despite lower prevalence rates than expected, our findings here revealed important risk and protective factors for IPV among rural Chinese women.

This study also confirmed findings from previous studies suggesting that social support is an important protective factor for IPV against women. Several considerations may explain the association. First, social support is often a source of empowerment for women [38]. For example, an ethnographic study revealed that attending social activities could increase women's influence and prestige, and, in turn, decrease the risk for IPV [39]. Similarly, another anthropological study suggested that the more social support women have, the greater their social resources, and the more they pay attention to their rights [40]. Women with higher social support might decide to end the violent relationships and decrease their risks [40]. Second, perpetrators' controlling behaviors usually limit victims'

interactions with other people, isolate victims, lower their social support level, and eventually lead to an increase of IPV risk and a vicious cycle [41]. Third, social support will buffer the negative and traumatic experience victims have been through. The Buffer Theory suggests that social support can buffer adverse life events and the negative impacts; individuals with high social support levels thus could cope with adverse events well and maintain physical and mental wellness [42]. In a 2002 study, Ann Coker and colleagues reported that, among American female IPV victims aged 18 to 65 years old, victims with high social support had greater perceptions of their mental health, better physical health, lower prevalence of depression, anxiety, suicidal ideation and post-traumatic stress disorder (PTSD) [43].

Unlike social support, the association between sociodemographic factors and IPV are not consistent with previous studies. We did not find a significant relationship between age and IPV, but other studies have shown that younger age is a risk factor for both male perpetrators' violent behaviors and female victims' violent experiences [44-48]. This study found that the higher education level rural women had, the lower their risk for psychological violence, which was consistent with other studies [13 49 50]. Though education level had insignificant effects on physical and sexual violence in this study, we attributed this to the fact that the prevalence of physical and sexual violence was lower than psychological violence in this sample. The sample also had a low proportion of women with a relatively high education level; only 120 women received high school education and above.

This study found an indirect relationship between objective economic status and IPV. This relationship remains unsettled in current literature. Some studies reported that low family economic status was a critical risk factor for male to female violence [45]. Faced with the stress of poverty, males may be more likely to use violent behaviors as a solution to release pressure [38]. However, a study in South Africa reported that extremely poor family economic status protects women from IPV [51]. Other studies have reported that, compared with objective family economic status, the contribution women made to family income was a more important factor—women who made little contribution or were totally dependent on their partners faced increasing risk of IPV [34 38 50 52].

We recognize several limitations. As a cross-sectional field study, interviewers were only able to recruit residents at home during the survey days; thus, some who had day-jobs may have been missed. As China has a vast territory and many nationalities, rural women in different areas face various living environments, cultural backgrounds and customs in which attitudes towards IPV may vary; hence we must be cautious to generalize our results. We did not investigate the relationship between IPV and other important factors, including childhood maltreatment, marital satisfaction, education disparity between couples, and women's financial contributions to their families.

We encourage future investigators to investigate these factors and their relationships with IPV, to fully understand IPV against women in China to develop and implement effective interventions. It will be important to examine cultural barriers, such as Confusion precepts, to explore how these affect normative assumptions and openness to

speaking with others about their experiences. Another traditional Chinese expression is "*Jia chou bu ke wai yang*," which means one should not reveal family disgrace to outsiders [53-56]. It is possible that the belief in this notion of family disgrace could lead some participants to under-report victimization and male-to-female violence.

Conclusion

Findings from this study indicated that the overall IPV prevalence in Guangyuan rural areas was close to that in northwest of China. And we found personal and interpersonal factors, especially social support, were linked to the occurrence of IPV.

In 2016, China implemented its first law against violence, which emphasizes global responsibility of different societal sectors to stop violence, including government departments, judiciary authorities, non-governmental organizations, enterprises and institutions, and the citizens. Future work is needed to develop, test, and then disseminate IPV prevention and intervention programs. Our data suggested that reinforcing social support networks offers the potential to enhance real and perceived protection, which in turn may reduce the morbidity and mortality associated with IPV.

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Conflict of interest

The authors declare that they have not conflict of interest.

Ethical Statement

The Ethics Committee of Sichuan University reviewed and approved the protocol, including the verbal informed consent process (NO.2011004-1). The University of Rochester Research Subjects Review Board reviewed the approval from Sichuan University and approved analyses of de-identified data.

Contribution

FH designed the survey instruments, implemented the field survey, monitored data collection, cleaned the data, developed the plan for analysis, analyzed the data, drafted and revised the paper. CC designed the survey instruments, trained interviewers, assisted with the analysis plan, revised the paper, and supervised FH. MNW designed the survey instruments, trained interviews, and revised the paper. EDC initiated the project, revised the paper, and supervised FH. PQ initiated the project, designed the survey instruments, monitored data collection, cleaned the data, and revised the paper. All authors had full access to all the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis. All authors read and approved the final manuscript.

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Data sharing statement

The data set is available from the corresponding author at qiupeiyuan@scu.edu.cn.

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Table 1.1 Demographic information of participants

Demographic Characters		n	IPV victim		Prevalence (%)	χ^2	*p*
			No	Yes			
Age	16-29	204	127	77	37.75	19.873	0.001
	30-39	225	159	66	29.33		
	40-49	468	320	146	31.20		
	50-59	364	276	88	24.18		
	60-69	188	138	50	26.60		
	70-	52	45	7	13.46		
Education	Never educated	497	375	122	24.55	11.378	0.023
	Primary school	623	442	181	29.10		
	Junior high school	283	183	100	35.33		
	High school	98	50	26	26.53		
	College and above	22	15	7	31.82		
Family annual income	0-9999 Yuan	265	194	71	26.79	3.237	0.663
	10000-19999 Yuan	371	263	108	29.11		
	20000-29999 Yuan	346	248	98	28.32		
	30000-39999 Yuan	213	152	61	28.64		
	40000-49999 Yuan	116	83	33	28.45		
	≥50000 Yuan	190	125	65	34.21		
Perceived family financial status*	Affluent	182	124	58	31.87	9.091	0.028
	Basic enough	788	582	206	26.14		
	Difficult	469	318	151	32.20		
	Very difficult	47	28	19	40.43		
Comparing with others*	Wealthier	81	62	19	23.46	1.363	0.506
	Same	858	606	252	29.37		
	Poorer	546	384	162	29.67		
Comparing with previous years*	Better	1119	810	309	27.61	6.095	0.047
	Same	228	147	81	35.53		
	Worse	137	94	43	31.39		

Note: "*" indicates missing data; "#" indicates using Fisher exact test; "IPV" is the abbreviation of intimate partner violence.

Table 1.2 The social support level of participants

Social support	Mean	IPV victim		F	*p*
		No	Yes		
Total score	37.33±5.13	37.77±4.74	36.28±5.86	26.289	0.000
Social interaction	7.81±1.70	7.82±1.70	7.81±1.68	0.002	0.962
Perceived social support	18.89±2.74	19.15±2.58	18.24±3.00	35.154	0.000
Instrumental social support	10.62±2.38	10.78±2.18	10.23±2.77	16.778	0.000
Family properties	7.54±2.97	7.50±2.93	7.63±3.05	0.604	0.437

Note: "IPV" is the abbreviation of intimate partner violence.

Table 2 IPV experiences of participants

IPV experiences	No (%)	Yes (%)
Ever experienced in the past 12 months	1065 (70.95%)	436 (29.05%)
Physical violence	1386 (92.34%)	115 (7.66%)
Psychological violence	1102 (73.42%)	399 (26.58%)
Sexual violence	1453 (96.80%)	48 (3.20%)

Note: "IPV" is the abbreviation of intimate partner violence.

Table 3 Factor loadings and path coefficients of the final model

Model	Dependent variables	Independent variables	Statistics results	
			Standardized coefficient	*p*
Measurement model	OE	A3	0.61	0.00
		A4	0.79	0.00
	PHV	C1	0.84	0.00
		C2	0.98	0.00
	PSV	C3	0.45	0.00
		C4	0.71	0.00
	SV	C5	0.76	0.00
		C6	0.65	0.00
	SS	D1	0.55	0.00
		D2	0.42	0.00
		D3	0.40	0.00
Structure model	PHV	SS	-0.12	0.005
		OE	0.060	0.14
	PSV	SS	-0.35	0.00
		OE	0.11	0.060
	SV	SS	-0.12	0.021
		OE	0.062	0.11
	OE	A1	-0.18	0.00
		A2	0.30	0.00
	SS	A1	-0.068	0.18
		A2	0.13	0.012
		OE	0.41	0.00
Factor related	PSV	PHV	0.91	0.00
	SV	PHV	0.30	0.00
		PSV	0.46	0.00
	C5	C1	0.31	0.00
	D3	D2	0.41	0.00

Note: OE=Objective economic status; SS=Social support; PHV=Physical violence; PSV= Psychological violence; SV=Sexual violence; A1=Age; A2=Education; B1=Family annual income; B2=Family properties; C1= Being pushed, shoved or slapped; C2=Being punched, kicked or beat-me-up; C3=Being insulted, swore, shouted, yelled at; C4= Being threatened to destroy belongings; C5= Sex against will with physical force; C6= Sex against will without physical force; D1=Social interaction; D2=Perceived social support; D3=Instrumental social support.

Table 4 Direct and indirect effects of the final model

Factors	Physical violence			Psychological violence			Sexual violence		
	Direct effect	Indirect effect	Total effect	Direct effect	Indirect effect	Total effect	Direct effect	Indirect effect	Total effect
Age	——	0.005	0.005	——	0.030	0.030	——	0.005	0.005
Education	——	-0.011	-0.011	——	-0.056*	-0.056*	——	-0.011	-0.011
Objective economic status	0.060	-0.047*	0.013	0.11	-0.014*	-0.033	0.062	-0.047*	0.015
Social support	-0.12*	——	-0.12*	-0.35*	——	-035*	-0.12*	——	-0.12*

Note: "*" indicates $p<0.05$.

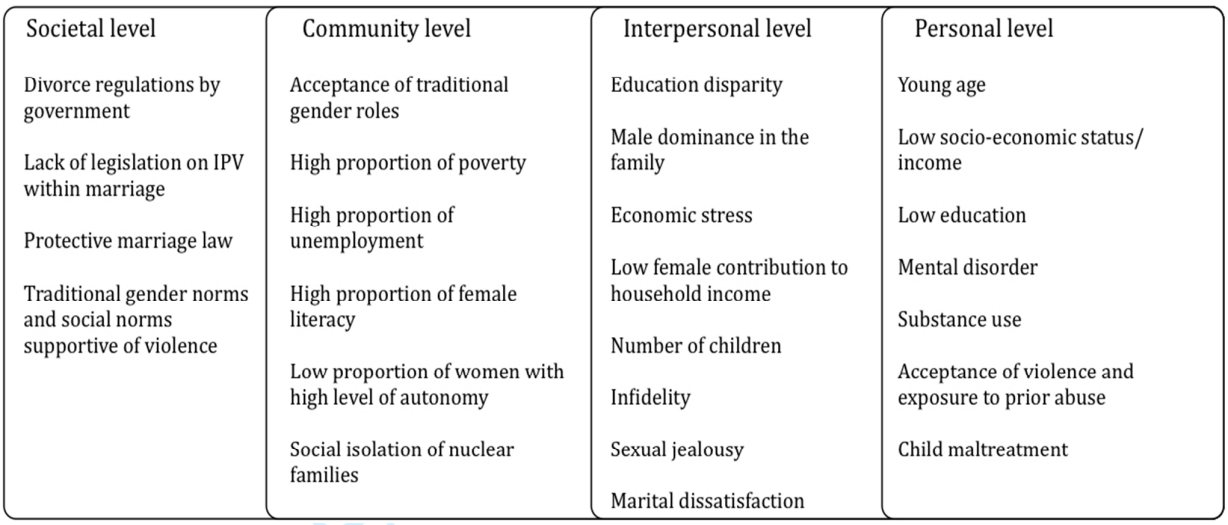

Figure 1 The socio-ecological model of risk factors of IPV

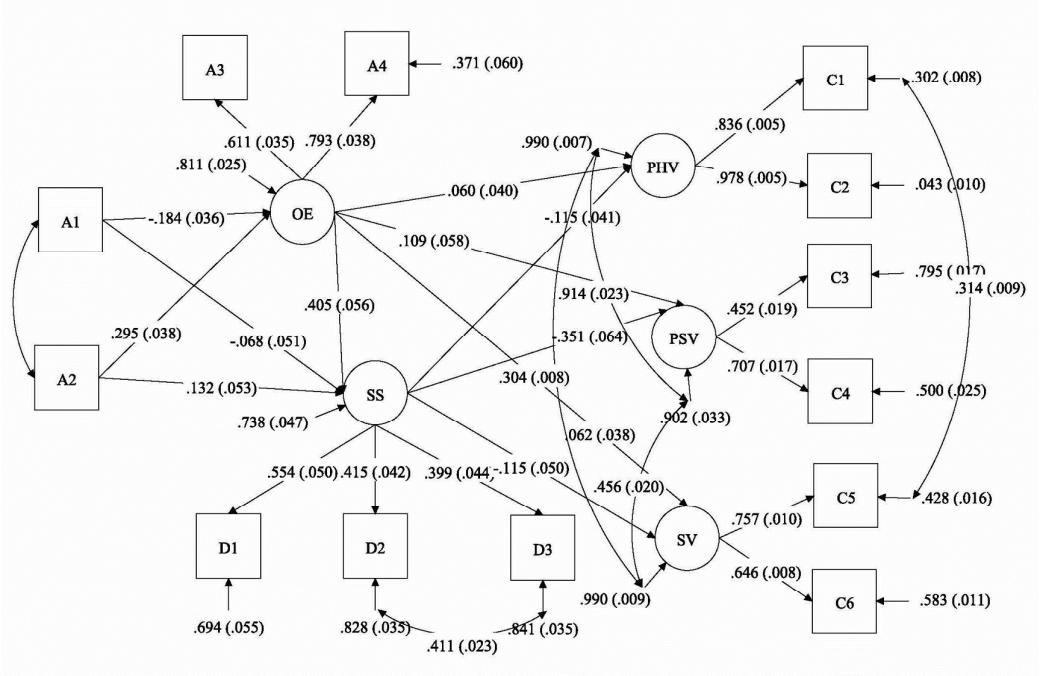

Figure 2 The final confirmatory factor analysis model

Note: OE=Objective economic status; SS=Social support; SE= Subjective economic status; PHV=Physical violence; PSV= Psychological violence; SV=Sexual violence; A1=Age; A2=Education; A3=Family annual income; A3=Family properties; C1= Being pushed, shoved or slapped; C2=Being punched, kicked or beat-me-up; C3=Being insulted, swore, shouted, yelled at; C4= Being threatened to destroy belongings; C5= Sex against will with physical force; C6= Sex against will without physical force; D1=Social interaction; D2=Perceived social support; D3=Instrumental social support.

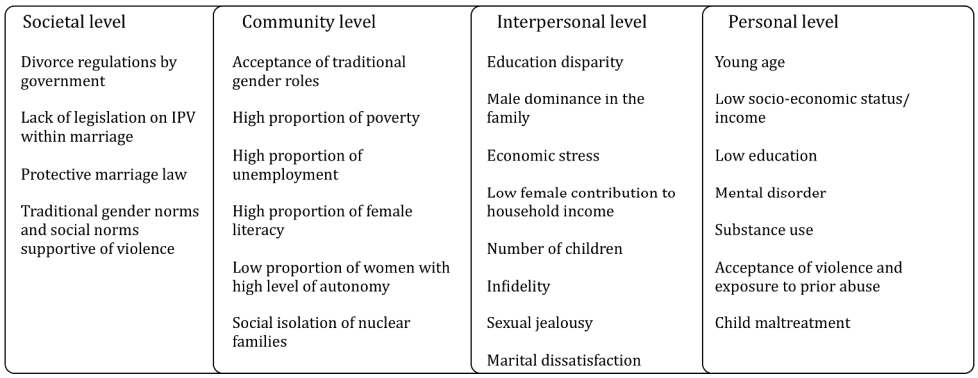

Figure 1 The socio-ecological model of risk factors of IPV

303x121mm (300 x 300 DPI)

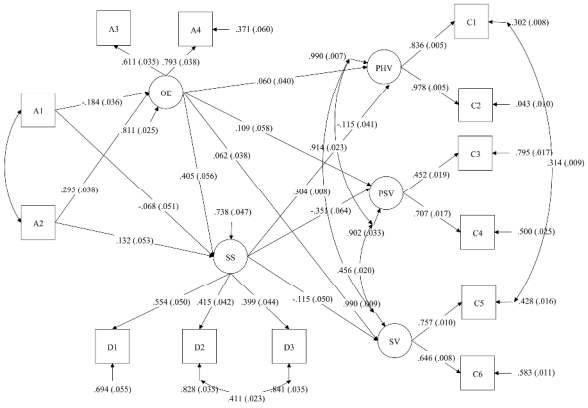

Figure 2 The final confirmatory factor analysis model

499x240mm (300 x 300 DPI)

Appendix 1 Latent and observation factors

Latent factors	Observed factors
	Age, A1
	Education, A2
Objective economic status, OE	Family annual income, A3
	Family properties, A4
Subjective economic status, SE	Perceived family financial status, B1
	Comparing with others, B2
	Comparing with previous years, B3
Physical violence, PHV	Being pushed, shoved or slapped, C1
	Being punched, kicked or beat-me-up, C2
Psychological violence, PSV	Being Insulted, swore, shouted, yelled at, C3
	Being threatened to destroy belongings, C4
Sexual violence, SV	Sex against will with physical force, C5
	Sex against will without physical force, C6
Social support, SS	Social interaction, D1
	Perceived social support, D2
	Instrumental social support, D3

STROBE Statement—checklist of items that should be included in reports of observational studies

	Item No	Recommendation	Page number
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	1
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	2,3
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	5
Objectives	3	State specific objectives, including any prespecified hypotheses	7,8
Methods			
Study design	4	Present key elements of study design early in the paper	8
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	8
Participants	6	(*a*) *Cohort study*—Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up *Case-control study*—Give the eligibility criteria, and the sources and methods of case ascertainment and control selection. Give the rationale for the choice of cases and controls *Cross-sectional study*—Give the eligibility criteria, and the sources and methods of selection of participants	8,9
		(*b*) *Cohort study*—For matched studies, give matching criteria and number of exposed and unexposed *Case-control study*—For matched studies, give matching criteria and the number of controls per case	-
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	10-12
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	10-12
Bias	9	Describe any efforts to address potential sources of bias	21
Study size	10	Explain how the study size was arrived at	8
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	13,14
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	12-14
		(*b*) Describe any methods used to examine subgroups and interactions	No applicable
		(*c*) Explain how missing data were addressed	14
		(*d*) *Cohort study*—If applicable, explain how loss to follow-up was addressed *Case-control study*—If applicable, explain how matching of cases and controls was addressed *Cross-sectional study*—If applicable, describe analytical methods taking account of sampling strategy	8
		(*e*) Describe any sensitivity analyses	No applicable

Continued on next page

Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	14
		(b) Give reasons for non-participation at each stage	21
		(c) Consider use of a flow diagram	-
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	14, 15
		(b) Indicate number of participants with missing data for each variable of interest	14
		(c) *Cohort study*—Summarise follow-up time (eg, average and total amount)	-
Outcome data	15*	*Cohort study*—Report numbers of outcome events or summary measures over time	-
		Case-control study—Report numbers in each exposure category, or summary measures of exposure	-
		Cross-sectional study—Report numbers of outcome events or summary measures	15,16
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	No applicable
		(*b*) Report category boundaries when continuous variables were categorized	14, 15
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	No applicable
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	No applicable
Discussion			
Key results	18	Summarise key results with reference to study objectives	17-21
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	21
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	17-21
Generalisability	21	Discuss the generalisability (external validity) of the study results	21, 22
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	22

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.